

NORTH ATLANTIC TREATY ORGANIZATION



RESEARCH AND TECHNOLOGY ORGANIZATION

BP 25, 7 RUE ANCELLE, F-92201 NEUILLY-SUR-SEINE CEDEX, FRANCE

RTO MEETING PROCEEDINGS 55

## Officer Selection

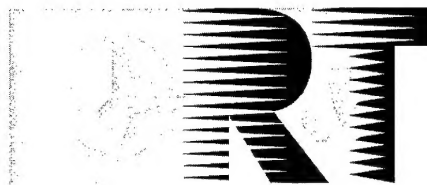
(la Sélection des officiers)

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*Papers presented at the RTO Human Factors and Medicine Panel (HFM) Workshop held in Monterey, USA, 9-11 November 1999.*



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# The Research and Technology Organization (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by 7 Panels, dealing with:

- SAS Studies, Analysis and Simulation
- SCI Systems Concepts and Integration
- SET Sensors and Electronics Technology
- IST Information Systems Technology
- AVT Applied Vehicle Technology
- HFM Human Factors and Medicine
- MSG Modelling and Simulation

These Panels are made up of national representatives as well as generally recognised 'world class' scientists. The Panels also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier cooperation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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# **Officer Selection**

**(RTO MP-55)**

## **Executive Summary**

The Human Factors and Medicine (HFM) Panel held a workshop on "Officer Selection" at the Hilton Hotel in Monterey, California, USA, 9th - 11th November 1999. The workshop was open to all NATO nations and to Partners for Peace (PfP) nations (under special arrangements). Conducted in conjunction with the 41st Annual Conference of the International Military Testing Association (IMTA), the joint conference was hosted by the Security Research Center (SRC) and the Defense Manpower Data Center (DMDC).

The theme of this workshop, officer selection, is an issue of central importance to the military forces of all countries, since it determines which individuals, with what characteristics, will be available to lead the forces in the future. Military officer job requirements are expanding to accommodate the demands for rapid deployment of cross-national forces as peacekeepers. This new role is quite different from the traditional warrior role. Computer technology and information systems are becoming increasingly sophisticated, requiring new skills for the future "digital battlefield." The speed required for information acquisition, analysis, synthesis, and decision-making is increasing. In addition, as the military recruiting environment becomes more difficult, accurate and cost-effective methods of personnel selection are essential.

Thirty-three workshop papers were presented by representatives from: Austria, Belgium, Canada, the Czech Republic, Denmark, France, Germany, Italy, The Netherlands, Poland, Singapore, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom, and the United States.

This workshop was of great interest to the military, addressing the following general topics:

- Influence of a country's history and culture on current officer recruiting and selection practices
- Sources of commissioned officers
- Job analysis to identify critical skills
- Leadership and motivation
- Improvements in selection procedures (e.g., assessment centers, interviews, and task simulation), instruments (e.g., personality tests), and delivery systems
- Recruiting ethnic minorities to achieve demographic representation
- Advances in information technology and computer-based personnel assessment

A careful reading of the papers presented in this workshop provides an opportunity for cross-fertilization of ideas between military and civilian personnel managers and researchers from many countries and across many professional disciplines.



# la Sélection des officiers

(RTO MP-55)

## Synthèse

La commission sur les facteurs humains et la médecine (HFM) a organisé un atelier sur « La sélection des officiers » à l'hôtel Hilton à Monterey, en Californie (Etats-Unis) du 9 au 11 novembre 1999. Cet atelier était ouvert à l'ensemble des pays membres de l'OTAN, ainsi qu'aux pays du Partenariat pour la paix (PpP) (dans des conditions particulières). Tenue conjointement avec la 41<sup>ème</sup> conférence annuelle de l'Association internationale d'essais militaires (IMTA), la conférence a été organisée par le Centre de recherche sur la sécurité (SRC) et le Centre de traitement informatique des effectifs de la Défense (DMDC).

Le thème de cet atelier, la sélection des officiers, est d'une importance capitale pour les forces armées de tous les pays, car elle détermine les caractéristiques des personnes qui seront à la tête de ces forces à l'avenir. Les descriptions de poste des officiers militaires évoluent pour tenir compte de l'éventuel déploiement rapide de forces internationales dans le cadre du maintien de la paix. Ce nouveau rôle est tout à fait différent de celui du combattant classique. Les technologies de l'informatique et des systèmes d'information sont de plus en plus sophistiquées et de nouvelles compétences sont demandées pour la création du « champ de bataille numérique » de demain. Les délais accordés pour l'acquisition, l'analyse et la synthèse des données nécessaires à la prise de décisions sont de plus en plus courts. En outre, vu les difficultés croissantes rencontrées dans le domaine du recrutement militaire, il est impératif de mettre en place des méthodes de sélection fiables et rentables.

En tout, trente trois communications ont été présentées lors de l'atelier par des représentants des pays suivants : l'Autriche, la Belgique, le Canada, la République Tchèque, le Danemark, la France, l'Allemagne, l'Italie, les Pays-Bas, la Pologne, le Singapour, la Suède, la Suisse, la Turquie, l'Ukraine, le Royaume-Uni et les Etats-Unis.

Cet atelier, qui a présenté un grand intérêt pour les militaires, a abordé les sujets suivants :

- l'influence de l'histoire et de la culture d'un pays sur les pratiques actuelles de sélection et de recrutement des officiers
- les origines d'officiers engagés
- l'analyse des postes afin d'identifier les compétences nécessaires
- les qualités de commandement et la motivation
- les améliorations possibles au niveau des procédures de sélection (par exemple les centres d'évaluation, les entretiens et la simulation des tâches), les instruments, (par exemple les tests de personnalité), et les systèmes de livraison des informations
- le recrutement de minorités ethniques afin d'obtenir une représentation démographique
- les avancées dans le domaine des technologies de l'information et de l'évaluation informatisée du personnel

Une lecture attentive des communications présentées lors de cet atelier permettra d'apprécier les échanges d'idées qui ont eu lieu entre gestionnaires du personnel civils et militaires et chercheurs de nombreux pays et de disciplines diverses.

# Contents

	Page
<b>Executive Summary</b>	iii
<b>Synthèse</b>	iv
<b>Preface</b>	viii
<b>Human Factors and Medicine Panel Officers</b>	ix
	Reference
<b>Technical Evaluation Report</b> by W.A. Sands	T
<b>SESSION I: NATIONAL OFFICER SELECTION SYSTEMS 1</b>	
<b>Policies, Procedures, and People: The Initial Selection of U.S. Military Officers</b> by J.M. Arabian and J.A. Shelby	1
<b>ACABO - The Assessment Center for Future Professional Officers in the Swiss Army</b> by H. Annen	2
<b>Officer Selection in the Danish Armed Forces</b> by S. Meincke	3
<b>The Psychological Selection of Officer Candidates in Austria</b> by E. Frise	4
<b>SESSION II: SPECIAL TOPICS ON OFFICER SELECTION 1</b>	
<b>Development of a Personality Test Battery to be Used in Officer Selection in the Turkish Armed Forces</b> by H.C. Sumer, N. Sumer, Nesrin Sahin, Nail Sahin, K. Demirutku and B. Eroglu	5
<b>Predictions from Physical Fitness Tests Impact of Age and Gender</b> by U. Bergh and U. Danielsson	6
<b>Personality Hardiness as a Predictor of Officer Cadet Leadership Performance</b> by P.T. Bartone	7
<b>SESSION III: CONCEPTUAL ASPECTS OF OFFICER SELECTION 1</b>	
<b>A Person-Oriented Job Analysis for Identifying Skills and Personality Attributes to be Assessed in Officer Selection</b> by H.C. Sumer, N. Sumer and K. Demirutku	8

<b>Officer Selection in the 21<sup>st</sup> Century</b> by M.G. Rumsey, L.A. Ford, R.C. Campbell, J.P. Campbell, D.J. Knapp and C.B. Walker	<b>9</b>
<b>Changing Job Requirements in Relation to Required Abilities or Personality Traits During a Military Career</b> by J. Terpstra	<b>10</b>

#### **SESSION IV: SPECIAL TOPICS ON OFFICER SELECTION 2**

<b>Research and Theory on the Motivation to Lead: Implications for Officer Selection</b> by K.-Y. Chan, K.C. Ong and C. Chah	<b>11</b>
<b>The Structured Interview</b> by R.W. Thompson	<b>12</b>
<b>Matching Selection Criteria and Ultimate Vocational Criteria for Officers in the Belgian Armed Forces</b> by J. Mylle	<b>13</b>

#### **SESSION V: NATIONAL OFFICER SELECTION SYSTEMS 2**

##### **Paper 14 withdrawn**

<b>Officer Selection in the Federal Armed Forces of Germany</b> by W. Birke	<b>15</b>
<b>The Officer Selection in the Belgian Armed Forces</b> by Y.A. Devriendt	<b>16</b>
<b>Officer Selection in the Czech Army after 1989-Problems Induced by Previous History of the Totalitarian Rule</b> by J. Sykora, J. Dvorak, F. Bittner, C. Bernardova, V. Cermak and I. Hoza	<b>17†</b>

#### **SESSION VI: SPECIAL TOPICS ON OFFICER SELECTION 3**

<b>Selection of Officers for U.S. Naval Aviation Training</b> by H.P. Williams, A.O. Albert and D.J. Blower	<b>18</b>
<b>CAPSS: The Canadian Automated Pilot Selection System</b> by D.E. Woycheshin	<b>19</b>
<b>Difficulties in Accessing a Representative Pilot Force: The Demographic Challenge and Views of Minority Pilot Focus Groups</b> by J.M. Barucky and B.M. Stone	<b>20</b>
<b>Officer and Pilot Selection System in Turkish Air Force</b> by I. Bekmezci	<b>21</b>
<b>Theoretical and Organizational Aspects of Professional and Psychophysiological Selection of Military Servicemen in Armed Forces of Ukraine</b> by V.V. Korolev, V.I. Varus, V.N. Zhakhovsky and A.N. Volyansky	<b>22</b>

† Not available for public release. Copy may be obtainable from RTA on request.

## **SESSION VII: CONCEPTUAL ASPECTS OF OFFICER SELECTION 2**

<b>Significance of Metacognitive Variables on Officer Selection</b>	<b>23</b>
by C. Serusi and A.M. Autore	
<b>Officer Qualities</b>	<b>24</b>
by R.W. Thompson	
<b>Evolution of Aptitude Testing in the RAF</b>	<b>25</b>
by M. Bailey	

## **SESSION VIII: CONCEPTUAL ASPECTS OF OFFICER SELECTION 3**

<b>Swedish Officer Selection</b>	<b>26</b>
by L. Carlstedt and H. Widén	
<b>Metacognitive, Social and Interpersonal Skills and Aptitudes in Officer Performance with Distributed Teams</b>	<b>27</b>
by M.J. Cook and W. Klumper	
<b>Data Integration and Classification for an Officer Selection System</b>	<b>28</b>
by F.J. Lescreve	

## **SESSION IX: NATIONAL OFFICER SELECTION SYSTEMS 3**

<b>Recrutement et sélection dans l'armée française (Recruiting and Selection in the French Army)</b>	<b>29</b>
by S. Lagache	
<b>The Canadian Forces Officer Selection System</b>	<b>30</b>
by D.E. Woycheshin	
<b>Can Psychological Selection be the Same for All Dutch Officers?</b>	<b>31</b>
by W.H.M. Visser	
<b>The Conceptual System of Officer Applicants to Military High Schools from the Air Force, the Navy and the Army in Poland</b>	<b>32</b>
by O.E. Truszczyński and J.F. Terelak	

## **SESSION X: CONCEPTUAL ASPECTS OF OFFICER SELECTION 4**

<b>Technologies for Integrated Assessment and Selection Systems</b>	<b>33</b>
by E. Burke	

## **Preface**

Officer selection is a central issue to the military forces of all countries. The addition of new roles (e.g., participation in cross-national forces, peacekeeping, etc.), coupled with advances in information technology, creates additional skill requirements for military officers. At the same time, the recruiting environment is becoming increasingly difficult for a volunteer force, as the economy improves in many countries and private companies compete for the same scarce personnel resources. The combination of these factors provides a significant challenge to military personnel managers and researchers. This report includes papers covering a wide range of topics important to those with responsibilities for military officer recruiting, selection, and management.

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# TECHNICAL EVALUATION REPORT

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## 1. INTRODUCTION

The Human Factors and Medicine (HFM) Panel held a workshop on "Officer Selection" at the Hilton Hotel in Monterey, California, USA, 9th - 11th November 1999. The workshop was open to NATO nations and to Partners for Peace (PfP) nations (under special arrangements). Conducted in conjunction with the 41st Annual Conference of the International Military Testing Association (IMTA), the joint conference was hosted by the Security Research Center (SRC) and the Defense Manpower Data Center (DMDC). Dr. J. Riedel, Director, SRC, opened the combined IMTA/HFM Conference. He welcomed the attendees, provided a conference overview, explained the three-track organizational structure for presentations, and provided administrative information. General M. Pirou, NATO Research and Technology Agency, and Dr. C. J.E. Wientjes, Human Factors and Medicine Panel Executive, presented the Officer Selection Workshop Welcome. The presentation on the HFM Panel covered the mission and scope, the mode of operation, and highlights from the 2000 Program of Work. This presentation was followed by the Keynote Address, "Military Personnel Management: Future Trends and Challenges," presented by Vice Admiral P. A. Tracey, Deputy Assistant Secretary of Defense (Military Personnel Policy), U.S. Department of Defense. Finally, Dr. F. Schmidt, Professor, University of Iowa, gave the Invited Address, entitled "Reforming Data Analysis Methods: Benefits to Cumulative Research Knowledge." Beginning with the afternoon of the first day, the combined conference was organized into three parallel tracks: (a) IMTA papers, (b) IMTA symposia, and (c) HFM Officer Selection Workshop.

## 2. THEME

The theme of the workshop was officer selection processes and procedures. This is a topic of central importance because the selection of officer applicants determines who, with what skills and abilities, will be available to serve in military command functions in the future. In addition, the recruiting environment is becoming increasingly difficult, providing additional challenges to military personnel managers.

## 3. PURPOSE AND SCOPE

Over the centuries, military leaders have been selected in many ways: military skills, nobility, wealth, physical or political power, etc. In today's world, military commanders come from the pool of those chosen to be officers. A newly commissioned entry-level officer may become a General responsible for hundreds of thousands of troops. Clearly, the selection of entry-level officers has long-range implications. Although it is recognized that today's officer selection decisions are rooted in centuries of national culture and tradition, the topic seems well worth a contemporary review because of many recent changes in the world, including:

- Post-Cold-War military missions have changed, in many cases, from waging war to peacekeeping.
- In many NATO countries, conscription has been, or is being, abolished. Commanding volunteer troops can be very different from commanding conscripts.
- With fewer officers as a result of downsizing, the successful performance of each officer has magnified importance.
- Ongoing social issues, such as gender and ethnic equity, influence what officer selection decisions may be considered to be acceptable.
- All military systems are becoming increasingly sophisticated and technical; managing these high-tech, complex systems requires quick thinking, a high level of information assimilation, analysis, and processing abilities, and superior communication skills.
- Shrinking defense budgets require that all expenditures be leveraged for maximum return on investment.

With all of these changes, it is critical to review military officer selection procedures.



#### 4. WORKSHOP PROGRAM

In his welcoming remarks during the first morning of the combined conference, Dr. Wientjes discussed the HFM Panel mission, strategic priorities and thrusts, membership and representatives, and the program of work. He specified important research topics for human factors, operational medicine, and human protection. In conclusion, he reviewed the NATO Research Study Group on Officer Selection (RSG 31), discussing the history of the group, the members, goals, and products. During the course of the workshop, papers were presented by representatives from: Austria, Belgium, Canada, the Czech Republic, Denmark, France, Germany, Italy, The Netherlands, Poland, Scotland, Singapore, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom, and the United States.

#### 5. TECHNICAL EVALUATION

The Officer Selection Workshop track of the combined conference was opened by F. J. Lescreve, Chair, NATO Research Study Group on Officer Selection (RSG 31). He provided an overview of the papers and structure of the workshop. Dr. J. M. Arabian led off the presentations, reviewing the four sources of commissioned officers in the United States Forces (paper #01). The major source is through college Reserve Officer Training Corps (ROTC) programs. These officer candidates attend the civilian college or university of their choice. The Department of Defense financially supports all, or part, of their education; ROTC students are commissioned upon graduation. A more regimented (and higher prestige) source of commissioning is through appointment to one of the four Service Academies; again, students receive their commissions upon graduation. A third source of commissioning is through the Officer Candidate School (OCS) program. In this program, young people who have completed a four-year degree program can apply to attend an officer-training program and earn a commission. Some outstanding enlisted military people also are accepted into the officer ranks through OCS. A fourth source of commissioning is "direct commissioning." This is reserved for individuals in selected professional fields (e.g., clergymen, physicians, attorneys, etc.). C1C J. A. Shelby gave the latter part of this presentation. She provided a first-hand account of the selection, training, and education of a cadet at the United States Air Force Academy.

In paper #02, H. Annen described the role of an Assessment Center in the selection of officers at the Swiss Military College. The Assessment Center assists in identifying officer candidates who have the potential to become leaders focused on both goals and human beings. Expert ratings were used to develop the content and appraisal criteria of the instrument, which produced a requirement profile for professional officers. Trial assessments were held with officer candidates in 1992, and the Assessment Center became an operational selection tool in 1996. Empirical tests and anecdotal discussions indicate the instrument has high reliability and validity. It continues to be reevaluated periodically.

S. Meincke reviewed the psychological components of the selection of officer candidates in Denmark (paper #03). Psychological assessment has been part of Danish officer selection since 1952, and includes tests of intelligence, ability, and knowledge, a group exercise, and an evaluation by a psychologist. The results of these assessments are combined with information about the candidates' physical proficiency and military service ratings. A selection board makes the final decision. A predictive validity study has shown that it is possible to forecast the examination results of the officer training quite well ( $R = 0.57$ ). A separate study showed that an increasing percentage of officers are being promoted as the psychological assessment increases.

Bgdr E. Frise (paper #04) discussed the role of psychological assessment in the selection of candidates for the Military Academy in Austria. The entire Psychological Officer Selection Test takes 22 hours to complete, beginning at 1400 hours one day and concluding at 1200 hours on the following day. The test, which is based on the concept of "Ergo-Psychometry," yields higher validity if conducted under both normal and stress conditions. Stress is introduced into the testing process by playing disturbing noises and depriving the candidates of adequate sleep. Qualitative tests, questionnaires, and a psychological interview complete the process, which results in ratings for each candidate in four dimensions: intelligence; concentration, precision, and perception; stress resistance; and, personality traits. These dimensions are combined, resulting in the candidate's final evaluation.

Paper #05, by H. C. Sumer, N. Sumer, N. Sahin, N. Sahin, K. Demirutku, and B. Eroglu described the development of a personality test battery to be used by the Turkish Armed Forces in selecting "outside source" officers (vs. officers trained in military school). Three major steps are involved in the study: job analytic interviews with current and former officers to identify critical personality traits; development of the initial test

battery and pilot study; and, revision of the battery, final data collection, and development of initial norms. A questionnaire composed of personality traits identified in the interviews is being evaluated by an "approval sample" of army officers representing different ranks and classes. Information gained from this sample of officers will be used to develop a trial test battery that will be administered to a group of officers selected from outside sources. That battery will be evaluated and necessary revisions made. The revised battery will be administered to a larger sample and data will be collected on job satisfaction, commitment, and intention to leave. After evaluation of these findings, initial norms will be developed, and the battery will become part of the officer selection process. Follow-up studies are planned to assess the criterion-related validity of the personality measures.

Paper #06, by U. Bergh and U. Danielsson, discussed setting pass/fail levels in the use of physical fitness tests. One question involves whether to have a pass/fail level that is constant for both genders and across all age groups, or one that varies with gender and age. Gender and age aside, the goal is to have a pass/fail level that is linked to success in job tasks. It was noted that an often-overlooked problem in this area is the fact of different levels of ability in different population groups. For example, it is expected that in physical tasks, most men will out-perform most women, and most young people will out-perform most older people. Thus, it is to be expected that even among a group of people who all passed a physical test, there would still be differences between groups in success rates for physical job tasks: lower percentages of women and older people would be expected to succeed. In fact, that was shown to be the case in a study of firefighters.

P. T. Bartone, paper #07, discussed the role of "normal" personality traits in the selection of officer candidates for the U.S. Military Academy at West Point. He noted that evaluation of personality traits, as used in military selection, has often focused on attempts to identify candidates with abnormal personality traits. However, psychologically healthy people also vary widely in a range of normal dimensions such as extraversion, openness, and conscientiousness. There is reason to investigate the influence of variations in normal personality traits on the performance of military leaders. A normal personality dimension of particular interest was labeled "hardiness," a trait believed to develop early in life. Hardy people exhibit a high level of commitment, a feeling of control, tend to interpret stressful experiences as a normal part of life, and are open to change. Hardiness has been shown to act as a significant moderator of stress, for example, in US Gulf War soldiers. One class of US Military Academy cadets was followed over a period of four years of training. A predictive model was developed that included college entrance exam scores and measures of hardiness, traditional values, dominance, emotional stability, work orientation, and social judgment as predictors and leader development and performance as criteria. Results of the study indicate that the personality variables consistently showed predictive power equal to, or greater than, the cognitive variables. Further, "hardiness" was the strongest predictor of military development grades for the cadets.

In paper #08, H. C. Sumer, N. Sumer, and K. Demirutku elaborated on the work first presented in paper #05. Job analysis was characterized as the most central of all human resource management activities. The conduct of a person-oriented job analysis to identify essential personality attributes and skills for officers recruited by the Turkish Armed Forces from outside sources was described. A semi-structured interview form was developed based on input from subject matter experts. The form was used in individual interviews with officers from the Army, Navy, Air Force, and Gendarme. Additional interviews were held with former officers who had left voluntarily during the one-year, try-out period, and with high-ranking officers. Interview results were content-analyzed and many attributes were found to be related to successful performance as an army officer. Some of the most frequently mentioned traits were, conscientiousness, communication skills, respect for authority, managerial skills, openness to experience, honesty, military discipline, and emotional stability. Identified attributes were presented in questionnaire form to a large sample of army officers who were asked to rate the extent to which each attribute was relevant to, and important for, an army officer's job. Principal component analyses of weighted relevance ratings identified five personality dimensions important to the job of military officer: Conscientiousness / Self-Discipline, Military Factor, Self-Confidence, Agreeableness - Extraversion, and Leadership.

Paper #09, authored by M. G. Rumsey, L. A. Ford, R. C. Campbell, J. P. Campbell, D. J. Knapp, and C. B. Walker, addressed officer selection for the next century. Dr. Rumsey spoke about the need to consider not only current, but also future, job requirements in designing selection systems for military officers. In today's world, the job of the military is rapidly changing and evolving. It is reasonable to assume that the attributes that are associated with successful officer performance at the end of the 20th century may not be predictive of officer success in the future. The Army Research Institute is conducting a research project based on the dynamic application of strategic job analysis. Basically, the following issues are addressed: current job demands, factors

that will impact these demands in the future, and anticipated changes in these demands as a result of those impacts. In the future, junior officers are expected to have increased job demands in areas such as technical complexity of information to be understood and used, rate of information change, deployments in unconventional missions, and the need to supervise and develop subordinates from differing ethnic and cultural backgrounds. A preliminary set of attributes which might be especially relevant in meeting these changing demands includes general cognitive ability, integrity, achievement motivation, judgment and decision making, social competence, adaptability, and communication ability. Recognizing simultaneously that good predictors of officer success may be changing and that changing a selection system is expensive in many dimensions, it was suggested that periodic reviews be made of selection procedures, with an eye to both current and expected future needs.

Colonel J. Terpstra discussed changing job requirements in the Dutch armed services in paper #10. Within the last few years, the Netherlands has gone from a conscript to a volunteer military, consolidated four separate service selection center into a single selection center supporting all four services, and undergone a change in focus from large-scale, high-intensity conflicts to smaller operations. All of these changes result in changing job requirements for military personnel, and especially for officers. In addition, different skills and abilities are needed for junior officers, lieutenant colonels and colonels, and the most senior officers. It was concluded that junior officer selection should not be based on attributes that will not be called upon (and may not even be developed) until mid- or late-career. Instead, it is necessary to observe officer performance carefully around the age of 40 to identify those who have the integrative capacity that is essential for the highest rank officer personnel.

Paper #11, authored by K. Chan, K. C. Ong, and C. Chah, described some of the issues involved in identifying leadership potential and motivation in junior personnel who have been conscripted in the armed forces in Singapore. In a volunteer military, the motivation to lead may be assumed of officer candidates; in a country that requires universal military service of its young men, motivation to lead becomes a central issue in selecting and training junior leaders. A construct called Motivation to Lead (MTL) has been reported, and a study has been conducted to answer whether the motivation to lead can be identified, measured, or changed. Results suggest that such motivation can be conceptualized and measured. Although there are no empirical data yet to show that MTL predicts officer job performance, data do suggest that MTL may be predictive of participation and performance during leadership training, which may, in turn, be related to later leadership performance.

Squadron Leader B. Thompson spoke about the perceived and actual value of the interview as a selection tool in paper #12. He noted that some UK research data indicate that more than 20% of managers surveyed claimed to be able to "size up" the suitability of job candidates in the first five minutes. This suggests that much of that decision-making may be based on first impressions of a candidate's dress, attractiveness, handshake, walk, and other such quickly observable factors. In contrast to the current predilection to discredit the interview as a valid selection technique, the UK Royal Air Force finds that an interview which is well structured, conducted, and evaluated can yield information that is objective and highly useful in predicting success during officer training. Such an interview has a number of important characteristics. First, the interviewers are formally trained and have extensive military experience. Second, the interview is specifically structured and tailored to the questions at hand. Third, differences in interviewer opinion are discussed; when possible, a compromise is reached. In the rare cases of no compromise, differences are recorded and independently reviewed. Finally, interview boards undergo regular standardization checks. With these procedures in place, the structured interview is an integral, accurate method of personnel assessment.

In paper #13, Major J. Mylle reported on a study of officer selection in the Belgian armed forces investigating whether it was still true, as it should be, that selection criteria are based on ultimate criteria. This two-step study began with asking a small sample of officers in each of the Belgian armed forces to review a list of criteria actually tested in the selection process and add any additional criteria they found to be relevant. A list reflecting all criteria was then sent to battalion commanders, who were requested to assemble a group of approximately ten officers with different ranks and jobs to judge how critical each characteristic was for successful performance. Factor analysis of results identified five essential general traits (intelligence, sense of responsibility, self confidence, social behavior in small groups, and motivation), and one general military factor.

The presentation originally scheduled as paper #14 was cancelled. Dr. J. Ward volunteered to make a presentation on selected topics, based upon his 30+ year's experience in personnel and training research. He addressed two general areas of research: (1) using judgment models in personnel policy and, (2) computer-based personnel action systems. His first topic involved the use of judgment models in personnel policy.

He described policy capturing and policy modeling, using regression analysis. Then, he reviewed some computer-based personnel action systems. He concluded with some comments on the Invited Address, "Reforming Data Analysis Methods," presented earlier in the conference by Dr. F. Schmidt.

W. Birke, in paper #15, described military officer selection in a country that has faced a most interesting and challenging situation -- that of creating a military force where one does not already exist. For ten years after the end of World War II, Germany did not have any armed forces of its own. Beginning in 1955, a military force was reestablished with selection procedures that were aimed at preventing any misuse of military power. Four selection principles, born in the aftermath of Nazism, still essentially govern officer selection. First, selection is handled by a single central agency for all armed services. Second, aptitude requirements are uniform, with applicants for aviation being required to meet additional requirements. Third, assessment is holistic, with no standard algorithm for combining different aptitude data. Fourth, a panel of three people of differing educational and experience votes on the applicant's aptitude for service, based on conscientiousness, leadership potential, social competence, style of expression and communication judgment and decisiveness, learning and achievement motivation, stress resistance, reasoning, professional and career orientation, and physical fitness. Finally, he indicated that work on Computerized Adaptive testing (CAT) was proceeding and that CAT instruments would be used in the future.

As explained by Y.A. Devriendt in paper #16, the goal of officer selection in the Belgian Armed Forces is to identify candidates who can successfully lead groups of people in different and dangerous circumstances. Selection has five components: administrative, physical, medical, psychological, and academic. The psychological component of selection includes cognitive and personality assessment, and a semi-structured interview. Cognitive assessment covers verbal and abstract reasoning, spatial ability, memory, and organizational flexibility. Personality assessment includes a self-report life history form, a short form of the California Psychological Inventory, and motivational inventories. The candidate's performance on group tasks is a very important part of the psychological assessment. The goal of the semi-structured interview is to investigate certain competencies and to form an integrated picture of the candidate's overall suitability. All of the above information is used in the final selection of Belgian Armed Forces officers, with traditional exams of math and language playing the most important part. It was noted that the predictive validity of the selection procedures could possibly be improved by reducing the weight for traditional examination scores and increasing the weight assigned to the results of the psychological assessments.

Paper #17, by Dr. J. Sykora, Dr. J. Dvorak, Lt.Col. F. Bittner, Dr. C. Bernardova, Capt.V. Cermak, and Col. I. Hoza cannot be included in these proceedings because of its classification.

Paper #18, authored by H. P. Williams, A. O. Albert and D. J. Blower, reviewed the process of selecting Navy and Marine Corps officers for naval aviation training in the United States. This paper focused on one of the principal selection tools, the Aviation Selection Test Battery (ASTB), a paper-and-pencil test administered to all naval aviation applicants. Because ASTB plays such an early and important role in screening future naval aviators, its validity is continually reassessed. The current study indicated that ASTB continues to be an effective predictor of ground school grades. In addition, data from a computer-based test administered to a sub-set of subjects suggests that a combination of paper-and-pencil tests and computer-based performance tests may hold future promise.

In paper #19, D. E. Woycheshin reviewed the process of selecting pilot candidates in the Canadian Forces. In addition to following the same procedures for selection into any officer program, aviation applicants are also assessed via the Canadian Automated Pilot Selection System (CAPSS), a computer simulation of a single-engine light aircraft. The main strength of CAPSS is a realistic performance assessment; it measures various skills simultaneously, just as the need for those skills actually occurs during flight. The main weakness of CAPSS is that it is difficult to modify, so that it becomes hard to determine the effect of changing training procedures or training aircraft.

The U.S. Air Force is seeking to match the ethnic makeup of its officer corps to the ethnic makeup of the U.S. population, a goal of many organizations. Paper #20, authored by J. M. Barucky and B. M. Stone, described some of the issues involved in meeting this goal. Since a large proportion of Air Force leadership traditionally comes from the pilot force, it is an important goal to select and commission top quality minority pilots. Although percentages of African-American and Hispanic officer accessions reflect the percentages of college graduates from those population groups, significantly lower percentages of those minorities complete pilot training. Two studies, based on present and projected demographics and a series of focus group interviews,

found that some factors within minority communities may help to explain the discrepancy between rates of overall minority accessions and rates of flight training completion. Among the factors noted and discussed were: little interest in a military career among top minority students; what interest in a military career that does exist among minority students tends to be among vocationally oriented students who are primarily interested in the Army; negative perspective on military life among minorities; lack of interest in aviation careers based on limited exposure and experience; belief that aviation is a dangerous career; few minority role models in aviation; belief that minorities do not compete well in the selection process; and, potentially interested minority students may have difficulty obtaining information and completing the application process. In conclusion, it seems that a long-term, grass roots solution is required to address these issues.

In paper #21, 1stLt. I. Bekmezci emphasized the importance of the human component in selecting officers and pilots for the Turkish Air Force. He pointed out that for 40 years, 80% of aircraft accidents have involved the human factor, making it a crucial part of pilot selection. In Turkey, by law, the objective is to train all officers as pilots. Thus, the selection systems are highly integrated. Pilot applicants to the Turkish Air Force must successfully pass assessments in the following areas: university entrance examination and applications forms, initial medical check-up, physical fitness test, psychological tests (16 Personality Factor Questionnaire, Aircrew Aptitude Test, and Euro-NATO Portable Basic Attributes Test (PORTABAT)), three interviews (psychological, group, and decision making), final medical exam, experimental flights, and one month of military living. Candidates who qualify in all these areas are eligible to attend the Academy.

Paper 22, authored by V. I. Varus, V. V. Korolyov, V. N. Zhakhovsky, and A. N. Volyansky, provided a review of selection of military servicemen in the Ukrainian Armed Forces. The primary elements of the Ukrainian selection system are: medical, educational, socio-psychological, and psychophysiological. Organizational goals include: improving quality of recruits, decreasing training time, reducing the number of applicants found to be unsuitable, increasing stability of military units, reducing costs, maximizing health and longevity in service, and increasing personal satisfaction with one's work. The Ukrainian experience in officer selection shows that carefully planned selection techniques result in recruiting quality people who are themselves satisfied and meet the needs of the organization.

Paper #23, by Lt.Col. C. Serusi and Cpt. A. M. Autore, discussed the significance of metacognitive variables on officer selection. Since the fall of the Berlin Wall, there have been many changes in European geopolitics and an accompanying radical transformation in the nature of military operations. The armed forces have, in many cases, turned from waging war to conducting crisis management and peacekeeping activities. With this in mind, the role of military officers who must deal with these changing and evolving demands requires great ability and flexibility. Traditional assessment of "simple" abilities and traits may not be adequate to meet coming needs. Assessment of metacognitive traits may help to identify candidates who are well suited to meet the highly complex, often changing demands of the contemporary military.

Squadron Leader B. Thompson discussed officer qualities in the Royal Air Force (paper #24). He pointed out that there are large and crucial differences between people who are genuinely effective leaders and those who are "empty suits," merely wearing the trappings of rank. There is also a difference between those who are merely effective managers in situations involving fixed, predetermined parameters, and those who are truly visionary, decisive, and independent warrior leaders. Management skills can be taught; leadership generally cannot. Selection of officers must look more for potential than for developed qualities, keeping in mind that the very good officer is a rare breed.

M. Bailey, in paper #25, spoke about the evolution of aptitude testing in the UK's Royal Air Force. Aptitude testing began in the RAF in 1942, with essay writing, a math test, and a "general intelligence" test composed of verbal items. Within the following few years, a number of developments occurred: the need for a separate assessment of skills and personality was recognized, attention shifted from general selection to specific selection for people in different aviation roles, a series of tests was developed for selection into all six aircrew categories, and the need for specially trained testing staff was recognized. More recently, computer-based selection tests have been developed and validated. Another approach has been the "Domain Centered Framework," wherein standard scores for tests are averaged for each domain. The resulting domain scores are weighted to yield a composite for a job. This approach allows a single test battery to be used for different jobs, as the domains are differentially weighted for different jobs. Looking into the 2000s, it is possible that computer-based "virtual" tasks will be designed to assess the candidate's performance in a number of exercises and adaptive testing may be used.



In paper #26, L. Carlstedt and H. Widen discussed the history and present state of officer selection in Sweden. Like many other countries, Sweden began using psychological tests for selection in the 1940's, emphasizing personality variables. In the late 1960's public opinion turned against selection procedures, and formalized psychological assessment was abandoned in 1981. Ten years later, work began on a new selection system. The new system is based on the theories of Jaques and Stamp, which suggest that different levels in hierarchical organizations demand different qualities from employees. A philosophy that is central to this system is the notion that young people are taken into the military at an age when they have much growth and development ahead of them, and many different types of traits are important for the different jobs that they may hold in the next 20+ years as a career officer. Thus early selection procedures should focus not on identifying those young people optimally suited for specific military jobs, but on screening out those who are unsuited. The test battery which is now in use includes measures of general cognitive ability, general visualization, general crystallized intelligence, and personality traits. In addition, a semi-structured interview results in a rating of leadership potential and an assessment of psychological functioning. Criterion measures for this system are under construction.

A joint paper by M. J. Cook of Scotland and Dr. W. Klumper of The Netherlands (paper #27) addressed the special abilities and skills required of officers who work with distributed teams. Such officers, especially in a changing set of military operations, might work with teams that are widely separated, serving separate functions, and manned by many different individuals. The leader of such a team must have a high level of cognitive, cogno-social, and interpersonal skills. They must be effective communicators and have an ability to see things from others' perspectives. Such leaders need to be able to quickly prioritize tasks, resources, and goals, and appear calm, confident, and in control. A combination of psychological measures, assessment center evaluations, and an interview has promise for identifying candidates who could successfully function in such a demanding environment.

In paper #28, F. J. Lescreve of the Belgian Armed Forces described some of the central issues in selecting from a pool of young applicants those people who will lead the military of the future. First, there is the heterogeneous nature of the information that is believed to predict officer performance: medical information, physical fitness measures, ability scores, biographical data, etc. There are also questions of the degree of association between various measures and ultimate officer performance, as well as the question of whether it is necessary to already possess certain attributes or merely evidence the potential to acquire those attributes. Additionally, there is the issue of quantifying data of many different types, measured on various types of scales: nominal, ordinal, interval, and ratio. Applicants who have completed the selection process can be evaluated by one of two methods: a selection panel or a computer-based system. The Psychometric Model for classification decisions in the Belgian Armed Forces was discussed.

Colonel S. Lagache discussed recruiting and selection in the French Army (paper #29). The need to adapt recruiting and selection policies and procedures to a changing set of military requirements was discussed. The French Army has two goals. First, the system must attract and recruit the quantity and quality of officers necessary for a professional army. Second, the system must maintain the cohesiveness of the officer corps, which requires a close link between the functions of recruiting, selection, and human resource management. Various issues entailed in meeting these goals were discussed.

D.E. Woycheshin, in paper #30, gave an overview of officer selection in the Canadian Forces. Candidates in all officer entry programs follow the same general processing sequence, which is a combination of multiple-hurdle and compensatory models. Candidates who meet basic requirements (age, no legal problems, physically fit, passing score on ability test, etc.) are then interviewed. Finally all information is sent to a centralized board which compares all officer candidates on a national standard and produces a "merit list" rank ordering all applicants. Final decisions are made at Recruiting Services Headquarters. Additional assessments are required of candidates for Naval Officers (specialized testing and a structured interview) or Air Crew (assessment with a flight simulator).

W. H. M. Visser described the selection of Dutch officers in paper #31. For the last few years, all Dutch officers (with the exception of pilots) have been selected through one national Defense Selection center. There are two military academies in the Netherlands: the Royal Institute for the Navy and the Royal Institute for the Army and Air Force. Officer candidates are evaluated using the following assessments: Dutch nationality; minimum height; diploma with Dutch, English, math and, in some cases, physics; general capability tests; personality questionnaires; an interview; medical exam; and, specialized assessment procedures for marines and pilots. Each branch of the Dutch forces has its own Selection Admission Board, which considers the above information and makes final selection decisions.

In paper #32 by O.E. Truszczyński and J.F. Terelak, selection of officers in Poland was discussed. Initially, the challenge of standardizing procedures across numerous locations was identified as important. The current selection system, which concentrates on intellectual and temperamental assessments, is based on a combination of classical psychological testing and methods originally developed by Polish military psychologists. Intellectual assessment is based on the Guilford Intelligence Theory. Temperament assessment is based on The Temperament Questionnaire by J. Strelau. Each candidate also undergoes a psychological interview which is expected to provide data about expected candidate behavior in the face of environmental obstacles. Presently the Polish Air Force, Army, and Navy use somewhat different models to integrate assessment data and make selection decisions. It was noted that it is very important to continually monitor selection systems and modify them as necessary to meet changing situations.

E. Burke presented the final paper (#33) of the workshop. He discussed a 1993 review of Computer-Based Assessment (CBA) which summarized NATO research and development in three areas of work: (1) desktop computer systems delivering assessment tools; (2) Simulation-Based Assessment (SBA) systems for delivering work sample measures; and, (3) adaptive testing systems that deliver tests dynamically tailored to the individual examinee during the test session and systems that actually construct items "on the fly." The driving force for these developments is expected utility gains to the military. Since that 1993 review, several significant developments have occurred: (1) the widespread availability of inexpensive, yet powerful computers, (2) increased hardware and software reliability, (3) improved computer interfaces, (4) increased connectivity (e.g., Internet and e-commerce), and (5) greater hardware and software standardization. He identified distributed assessment as the key CBA advancement since 1993. A Distributed Assessment System (DAS) includes the following: (1) an integrated system that builds a progressive applicant profile, (2) dynamic cost assessment that shifts emphasis between breadth and depth of data collected in successive stages, (3) data mining at each stage to formulate a risk analysis and support decision-making, (4) availability of information for rapid transmission between geographically separated decision-makers, and (5) enhancement of the database with post-selection information on accepted applicants, creating the front-end of a Human Resources Information System (HRIS).

The final session of the workshop began with a presentation on the Officer Selection Survey by F. J. Lescreve. This extensive instrument was sent out to NATO, PfP, and other countries, and included 14 sections covering areas such as the legal framework for selection, applicant processing sequence, measuring instruments used, and the types and specific use of the information collected. The extensive results will be available in a computer database. The final report describing the results is expected to be available in mid-2000.

In conclusion, Dr. W. S. Sellman led a discussion summarizing the major topics addressed during the workshop. Since the fall of the Berlin Wall, all countries are concerned with a volunteer (vice conscripted) military force. The magnitude of the officer selection problem varies widely across countries with vastly different officer corps sizes. The legal constraints on use of certain data (e.g., biographical information) in personnel selection varies widely across countries. Training and human resource management are increasingly important as the recruiting environment becomes more difficult. Finally, it was concluded that a single NATO Officer Selection Model was not an appropriate goal. Rather, each country should learn from the research and experience of other countries, adopting selected ideas and procedures that will work in their unique military officer recruiting and selection environment.

## **Policies, Procedures, and People: The Initial Selection of U.S. Military Officers**

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United States military officers come from all walks of life so it follows that the policies and procedures for selecting and training officer candidates were designed with that in mind. There are four primary sources of commissioning. Most officers are commissioned through college Reserve Officer Training Corps (ROTC) programs. ROTC is less regimented than the programs at the second type of commissioning source, the four U.S. military academies -- U.S. Military Academy, U.S. Naval Academy, U.S. Air Force Academy, and U.S. Coast Guard Academy - but has the same goals. Officer Training/Candidate School is a third type of commissioning source and serves as an adjustable "valve" to augment the number of officers commissioned in each Service. Other programs, such as the Air Force's Leader Encouraging Airmen Development (LEAD), also exist and are designed to identify outstanding airmen for possible commissioning opportunities. The fourth source of officer commissioning is the direct commission, reserved for certain professionals (e.g., lawyers, physicians). Regardless of commissioning source, the U.S. military has high physical, academic, and moral character standards for individuals seeking to become a military officer. Rather than identify and select individuals for attributes, skills, and abilities needed at advanced officer grades, the U.S. military practices an "up or out" philosophy

wherein the training and selection of officers occurs throughout the course of a career.

The commissioned officer corps provides the senior leadership and management of the armed forces. In Fiscal Year (FY) 1999, there were 204,909 active duty officers across the branches of the military. In terms of active duty officers, the Air Force has the highest number (70,625 officers), the Army has 66,263 officers, the Navy has 51,885 officers, while the Marine Corps has 16,136 officers.

The officer candidate programs can be separated into two basic categories: those for college students and those for college graduates. Programs for college students may provide an education or offer varying levels of financial assistance to help cover the costs of a college education. These programs include the service academies and the Reserve Office Training Corps (ROTC). ROTC programs can be divided into two types: scholarship ROTC, which offers up to four years of financial assistance, paying for college tuition, required educational fees, textbooks, supplies, equipment and a monthly stipend; and non-scholarship ROTC, which provides a stipend only.

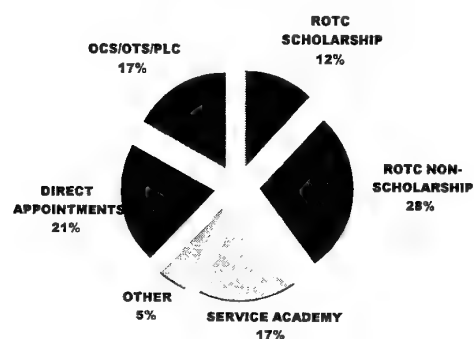
Programs for college graduates are covered under the general heading of Officer Candidate School



(OCS). Individuals may also be commissioned by direct appointment. These commissions are granted to persons who are professionally qualified in the medical or health field, as well as lawyers and chaplains. Officers who enter under this program are given a minimum of military training and are often commissioned at a higher rank.

The largest proportion of officer accessions typically come from the ROTC programs across the branches of the Armed forces. Direct Appointments account for approximately one fifth of the new officers; the military academies and Officer Candidate/Training Schools produce comparable proportions of new officers.

**Source of Commissioning**



A typical pattern of the percentage of officers commissioned by Service and source is provided in Table 1. The majority of Army and Air Force

**Table 1. Percent of Officer Accessions by Source of Commission and Service for FY 1998.**

	Army	Navy	Marine Corps	Air Force
Academy	14	19	12	19
ROTC	48	18	13	42
OCS	6	37	60	10
Direct Apt.	9	15	0	19
Other	17	6	15	0
Health Pro. Schl.	6	6	0	10

officers come from ROTC programs while the majority of Navy and Marine Corps officers come from officer candidate programs. Warrant Officer programs make up the "Other" category; Army helicopter pilots, for example, are frequently warrant officers. A small percentage of officers come from the Health Professions Scholarship Program.

## Description of Commissioning Sources

### Service Academies

The service academies include the United States Military Academy at West Point (Army), the United States Naval Academy (Navy and Marine Corps), the Air Force Academy, and the Coast Guard Academy. The service academies give student between the ages of 17 and 22 the opportunity to develop the knowledge, character, and motivation essential to leadership, which is necessary in order to be successful in their military career. All Service academies offer four years of college education leading to a bachelor of science degree. Cadets and midshipmen receive tuition, medical care, room and board, and are paid \$600 monthly for uniforms, books and incidental expenses. Upon graduation, those commissioned are obligated for an active duty period of at least five years. The tables below depict the officer production flow from the academies.

The overall academic and physical preparation of a candidate is of vital importance to success at any of the academies. The three major academies have highly competitive entrance standards, each accepting approximately 1,200 new cadets and midshipmen per year, which annually produce a thousand new commissioned officers for their parent Service. To apply to the academies, a junior or senior high school student must meet the qualification standards of the College Boards Scholastic Aptitude Test (SAT) or the American College Testing (ACT) program, they must also have received high grades in all areas of study while in high school. The student must meet the standards for the Candidate Fitness Test upon

entry. The fitness test evaluates the individual's physical fitness in terms of, for example, pull-ups, push-ups, sit-ups, a short run and the standing broad jump. To gain acceptance into an academy, the student must also receive a nomination from a member of congress, a presidential nomination, or a vice presidential nomination.. Table 2 provides application flow data for each of the academies.

**Table 2. Officer Production: Academy Application Flow by Service Academy and School Year.**

***U.S. Military Academy (Army)***

Class	2000	2001	2002	2003
No. of Appl.	12,886	12,744	12,442	11,491
No. of Qual.. Appl.	2,030	2,058	2,088	2,106
No. Who Enter	1,187	1,187	1,246	1,133

***Naval Academy***

Class	2000	2001	2002	2003
No. of Appl.	9,962	10,119	9,827	10,145
No. of Qual.. Appl.	1,920	1,728	1,774	1,814
No. Who Enter	1,212	1,175	2,231	1,232

***Air Force Academy***

Class	2000	2001	2002	2003
No. of Appl.	9,165	9,802	10,035	8,828
No. of Qual.. Appl.	2,164	2,122	2,129	2,195
No. Who Enter	1,230	1,117	1,216	1,330

***Reserve Officer Training Corps***

The Reserve Officer Training Corps (ROTC) is a program composed of about 475 Army, Navy, and Air Force units at public and private colleges and

universities nationwide. ROTC is traditionally a four-year program. There are different scholarships available to the college student to help pay for expenses. These scholarships are competitive and are given to applicants who show a high level of academic ability, are physically qualified, involved in extracurricular activities, and are of good moral character. The criteria for selecting scholarship winners include: 920 points on the SAT or 19 on the ACT, academic standing in high school (class rank and class size), evaluation or letter of recommendation from three high school officials, a personal interview, and documentation of achievement in extracurricular activities and leadership positions. The scholarships are worth up to \$16,000 per year, along with a stipend of \$200 per month.

ROTC training (electives in most schools) consist of two to five hours of weekly military instruction and some summer training programs in addition to the regular college program. The first two years of the program are comprised of classroom studies in subjects such as military history, leadership development, and national defense as well as practical leadership laboratories. A student can enroll in the program for the first two years at college as an elective with no military obligation. During the next two years, the student uses skills learned in the first two years and the summer training to organize and manage new ROTC students. In addition, each of the Services has a special program which allows interested students to enroll in the last two years of ROTC. Upon graduation from college, the student will be commissioned as a second lieutenant or ensign in their respective service and incur an eight-year service obligation (generally, four years active duty and four years reserve duty).

***Direct Appointments***

Direct appointments are available to individuals who are professionally qualified as doctors, nurses, and other health care providers, as well as lawyers and chaplains. Military lawyers must be graduates of law schools accredited by the American Bar Association. Lawyers usually enter active duty at an advanced rank. Military chaplains must possess 120 semester hours of

undergraduate credits from a college or university and possess a Master of Divinity degree. Chaplains may also enter at an advanced rank. Direct appointments can be applied for through the Army, Navy, Air Force, and the Coast Guard.

### **General Eligibility Requirements for Officer Commissions**

The general eligibility requirements for officer commissions are codified in U.S. law. Individuals appointed as commissioned officers must be able to complete twenty years of active commissioned service before their fifty-fifth birthday; exceptions for health care professionals are allowed. To be eligible for appointment as a commissioned officer in the regular forces, U.S. citizenship is required. Education requirements are determined by each Service. Generally, a bachelors degree is required; special occupations (e.g., physician, chaplain) may require additional vocational credentials which are determined by the Secretary of the Military Department concerned. Officer candidates are screened for moral character (e.g., background check, personnel references) as well as medically screened to insure that they are generally healthy, capable of completing required training, and able to meet the rigors of military life.

### **Aptitude Selection Measures for Officer Candidates**

Several aptitude tests are currently used by the armed services to select officer candidates. The academies, like most undergraduate colleges, use the SAT or the American College Test (ACT) in conjunction with high school class rank. ROTC programs primarily use SAT and ACT scores to determine eligibility, but some programs require additional tests. With the exception of the Marine Corps, Officer Candidate School (OCS) programs employ tests that have been developed specifically for officer selection. The Army uses the Officer Selection Battery (OSB) and the General Technical (GT) composite of the Armed Services Vocational Aptitude Battery (ASVAB), the enlistment aptitude test; the Navy uses the

Officer Aptitude Rating (OAR), the Academic Qualification Test (AQT) and the Flight Aptitude Rating (FAR), all of which are composites form the Aviation Selection Test Battery (ASTB); and the Air Force uses the Air Force Officer Qualifying Test (AFOQT). The Marine corps requires that applicants to all of its pre-commissioning programs (except for the Naval Academy and Naval ROTC, which are administered by the Navy) obtain a qualifying score on the SAT, the ACT or the Electronics Repair (EL) composite of the ASVAB. In addition, aviation applicants in the Marine Corps are required to achieve passing scores on the AQT-FAR.

The SAT and ACT play an important role in the selection of officer candidates in college programs. These are the traditional measures of academic ability used for incoming college freshmen in the academies and scholarship ROTC programs, much the same as in undergraduate colleges throughout the country. Because these programs involve a substantial monetary investment in the candidate's post-secondary education, the foremost concern at this point is the selection of individuals who will succeed in college. The SAT, developed by the Educational Testing Service for the College Entrance Examination Board, is a college entrance examination designed to measure general verbal and mathematical reasoning ability. The ACT, developed by the American College Testing Program, is also designed as a college entrance examination, measuring general verbal and mathematical comprehension.

The tests used in selecting candidates for OCS and OTS programs are intended to assess more specific aptitudes or characteristics that predict officer performance, since virtually all of the applicants, as college graduates, have already demonstrated a level of academic success. Many ROTC non-scholarship programs, geared mainly for college juniors and seniors, likewise use tests that are aimed at predicting success in the military, since most of the upper-class students are expected to complete college. The tests used to select officer candidates for OCS, OTS, and ROTC non-scholarship programs include the

OSB, the OAR-AQT-FAR, the AFOQT, and portions of the ASVAB.

## **Initial Selection Process for Officer Candidates**

### *Service Academies*

All three service academies use the "whole person" system for evaluation applicants. At West Point, a "whole person score" is derived from weighting three factors: academic aptitude, which combines SAT or ACT scores with high school rank (60 percent); leadership potential, which is estimated from athletic participation in high school and high school teacher recommendations (30 percent); and physical aptitude, which is measured with the Academy's Physical Aptitude Examination (10 percent). The Naval Academy assigns each applicant a numerical score, called the "candidate multiple," calculated from the following variables; SAT or ACT scores; high school class rank; evaluations by high school teachers; participation in extracurricular activities; and specially adapted scales from the Strong-Campbell inventory, which is designed to assess areas of interest and to predict career retention. The Air Force Academy's "selection composite" is similar to West Point's "whole person score" and is derived by weighting and combining the following elements: academics, which adds together SAT or ACT scores with high school rank (60 percent); extracurricular activities (20 percent); an admissions panel rating (20 percent), and an interview and candidates fitness test (no specific weighting).

Cutoff scores at the academies, may be waived for applicants who demonstrate exceptional potential in other areas of qualification. Those who meet the minimum qualifications of the institution then have their files reviewed by an admissions board. Subjective appraisals of an applicant's qualifications may be made at this point. In fact, at the Naval Academy, the admissions board may adjust an applicant's "candidate multiple" by up to 20 percent. The rationale is that the reviewers may be able to see something important in a

candidate's background that has been omitted from the "whole person" rating.

The highly selective selection process is followed by a demanding training program in the academies. The Air Force Academy is typical. The first year at the Academy serves to develop cadets as followers, since good officers must learn to be followers first and after a cadet completes their first year, the pride in themselves and confidence they have gained is indescribable. Each succeeding year, cadets are given more responsibility, for themselves and others, while also meeting a demanding academic schedule. The Academy strives to produce officers with a life-long commitment to personal and professional growth.

### *ROTC Scholarship Programs*

The Army employs a "whole person score" (WPS) in selecting candidates for its scholarship program. The WPS is composed of the following weighted factors: SAT or ACT score (25 percent); high school class standing (25 percent); participation in extracurricular activities and other elements that show leadership ability (40 percent); and the Physical Aptitude Examination (10 percent). The Army's WPS has a range of 1 through 999, and cutoff scores can change from one year to the next, depending upon the number and quality of applicants. Nevertheless, the scholarship program does establish specific cutoff scores for the SAT and ACT, and, if these minimums are not met, the candidate is rejected without further review.

The Navy's scholarship program uses a two-step process in selecting students: initial screening followed by final selection. SAT or ACT scores serve as the sole criterion for initial screening. Those who qualify are then reviewed by a selection board. Applicants who achieve the minimum required test scores are then evaluated on the basis of several weighted factors: SAT or ACT scores (19 percent); high school rank (56 percent); results of a structured interview by a naval officer (10 percent); results of the Strong-Campbell Interest Inventory, used to predict career tenure (9 percent); and scores derived from

a biographical questionnaire designed to predict retention (5 percent).

Students who enter naval ROTC under the Marine Corps option are required to have a slightly higher SAT score than naval candidates. Applicants who are able to achieve the required minimum scores for Marine Corps programs are then evaluated under the "whole person" concept. For most of the Marine Corps programs, the following factors are considered: recommendations from professors or employers; college transcripts; physical examination results; and the individual's work or military records. These factors are not weighted in any formal manner by Marine Corps reviewers.

In the initial screening for the Air Force scholarship, applicants are required to meet the following criteria before any further consideration is given: high school grade point average; high school class standing; and SAT or ACT score. An applicant's intended major in college is also very important in awarding scholarships. Applicants who have achieved the minimum test scores and high school grades are then evaluated by a scholarship selection board. The board reviews academic records, test scores, leadership experience, extracurricular activities and work experience. A personal interview, responses to a questionnaire and evaluations by high school officials are also used by the board in awarding scholarships.

#### *ROTC Non-scholarship Programs*

Currently, the Army's non-scholarship program uses the Pre-commissioning Assessment System (PAS) for selecting candidates. Pre-commissioning selection normally occurs at the beginning of the third year of college. Applicants are evaluated on the basis of physical fitness, grades, participation in extracurricular activities, writing skills and motivation (as determined through a structured interview). Applicants must also achieve a passing score on the OSB. Candidates who do not meet the minimum may be accepted if a "whole person evaluation" finds outstanding performance in another area that is seen to compensate for the lower OSB score.

The non-scholarship portion of the Navy's ROTC program is called the College Program. College program students are selected by individual units and standards vary by unit. There are no centrally established admission criteria (selection for scholarship programs of less than four years also take place at the various units, with no uniform criteria).

The Marine Corps also has a program, Platoon Leaders Course, for college students who decide to become Marine Corps officers. They participate in two six-week summer training courses (or, camps) and are commissioned upon receipt of their baccalaureate.

The Air Force uses the AFOQT in screening applicants for its non-scholarship programs. Minimum required scores must be met on the Verbal and Quantitative composites. Pilot and navigator candidates additionally must meet minimum scores on the Pilot and Navigator-Technical composites. Applicants are then given a Quality Index score. The Quality Index score is made up of both academic and non-academic factors that weighted roughly equally. Non-academic factors include the detachment commander's overall rating; review board rating of self-confidence, human relations, extracurricular participation and communication skills (from a structured interview and written exercise); and a physical fitness test. The academic component includes cumulative grade point average and the scores of the AFOQT Verbal and Quantitative composites. An applicant must also be in "good standing" with the academic requirement of their college; if not, they must possess a high enough cumulative grade point average.

#### *Officer Candidate School (OCS) Programs*

Factors considered in the selection of candidates for Army OCS include the Physical Aptitude Examination, college grade point average, letters of recommendation from former employers and professors, college major (engineering and science are preferred), and an interview by a selection board. Scores on the OSB and GT composite of the ASVAB are also used in the

selection process. To be eligible to apply to Army OCS, an applicant must have a minimum score on the technical-managerial leadership (cognitive) subtest of the OCB and a minimum score on the GT composite. The applicant's file is then sent to a selection board. The board, in turn, assigns a numerical rating to each applicant. The highest rated applicants are selected, based on the number of available positions in OCS.

The Navy OCS and AOCS programs consider an applicant's college grade point average, extracurricular activities, employment record, and physical examination results. However, before an individual is allowed to apply he or she must achieve a qualifying score on one or more of the ASTB composites. Navy OCS uses the OAR composite as a preliminary screening device. As a part of the Navy's affirmative action program, racial and ethnic minorities who score below the cutoff on the OAR can be accepted as students at the Officer Candidate Preparatory School before being placed in OCS. The Navy's AOCS program uses the AQT-FAR composites for preliminary screening.

Persons who wish to enter the Air Force OTS program are required to first achieve a minimum

score on the AFOQT. The individual's application is then submitted to a central selection board for evaluation. The selection board considers factors such as college grade point average, AFOQT scores, college major, work or military experience and leadership potential. No weighting formula is used by the board in evaluating candidate qualifications.

### Summary

Officer selection and commissioning in the U.S. is notable for the variety of programs, both within and between the Service branches. Although the initial selection process is central to the development of a volunteer, professional cadre of officers, the emphasis is more on "growing" military officers rather than on the initial selection process itself. Selection and training are continuous processes revolving around an "up or out" philosophy; in fact, the promotion system, beyond the scope of this paper, is an integral part of the system. As noted earlier, the U.S. approach to officer selection is to identify intelligent men and women of good character who can be trained to provide the leadership and management of the armed forces.

**- ACABO -**  
**The Assessment Center for Future Professional Officers in the**  
**Swiss Army**

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**Summary:** Each future professional officer of the Swiss armed forces has to pass an assessment center even before he starts his studies at the Military College. During this three-day procedure his personality characteristics and social behaviour are observed and appraised by several trained assessors /observers. The paper describes the organisational and scientific bases of this procedure, it explains which behavioural dimensions are used in which exercise and gives an account of the different steps of the assessment process. It ends with a description of the main evaluation results and with an indication of possible trends.

### 1. Introduction / starting point

In the winter semester 1991/92 the Swiss Military College (SMC) at the Federal Institute of Technology Zurich (ETH) opened a six-semester diploma study course for future professional officers. This education is not only focused on military and technical skills. The course should enable the participants to become convincing, target- and human-oriented leaders as well as instructing officers with a good general knowledge, who can also express themselves in a committed and competent way on non-military issues.

All the students of the Swiss Military College are both high school graduates (Matura) and officers of the Swiss Armed Forces. As in any other academic course seminar papers and test results can provide valuable clues to the abilities of the students. Yet, most of these criteria assess intellectual abilities (academic course) or practical skills (service with troops), which is important but not sufficient for the appraisal of future professional officers (Steiger, 1992).

As a result a procedure for the appraisal of personal and social competence was developed

and in 1992 the „freshmen“ of the diploma studies were the first to undergo an Assessment Center at the Swiss Military College. The aim of the SMC-Assessment was to gather clues for an appraisal by establishing a strengths/weaknesses profile and to give feedback linked to a plan of action. In this form the AC was neither a pure selection instrument, nor a long-term potential appraisal. Experience later on showed that it is possible with this instrument to obtain fair and sound assessments. In 1996 the AC eventually became a definite selection tool. Now the Assessment Center for Future Professional Officers regularly takes place before the beginning of the course of study.

### 2. Dimensions and exercises

The procedure of this AC was designed on the one hand with the help of militia officers who have first hand experience with assessment centres owing to their civil professional function. Professional officers with many years of experience and a large know-how on the other hand helped to formulate a job requirement profile. Furthermore, the persons responsible for the AC relied on experiences of the Israeli and Swedish Army, who at that time already used such tools.

Having in mind this theoretical and practical background, the persons responsible for the AC asked the following questions:

„How should a future professional officer behave as

- a teacher
- an educator
- a superior
- a colleague / subordinate
- a friend
- in a social context in general?“

In a pragmatic procedure, which relied on the Critical Incidents Technique (Flanagan, 1954), the requirements were specified during several sessions, which finally resulted in specific dimensions and exercises. Content and basic norms of the SMC-assessment were the result of an expert rating in the framework of a group process. They are thus an image of the corporate identity and leadership culture in the Swiss Armed Forces (Annen, 1995).

Currently the requirement profile a ACABO candidate has to fulfil consists of the following seven dimensions:

#### **Personal characteristics**

- personal attitude
- motivational behaviour
- analysis

#### **Social behaviour**

- social contact
- oral communication
- dealing with conflicts
- influencing behaviour

These dimensions are explicitly defined and handed out in written form to the observers. Examples of behaviour further illustrate the definitions of the dimensions.

The exercises must be designed in such a way as to enable the observers to make clear observations about the dimension in question, which must be visibly linked to the activity of a professional officer. By focusing on activities a candidate might meet immediately after completion of the SMC-studies, the following exercises were designed:

#### **Spontaneous short oral presentation**

Each participant makes a five-minute oral presentation in front of the other participants, the assessors, observers and the scientific staff. His task is to introduce himself and to give his view on a thesis he is given five minutes beforehand, so he can prepare his presentation while the previous presenter is making his presentation.

#### **Leaderless group discussion I**

The main characteristic of this exercise is its double aim: on the one hand to impose your own interest and on the other hand to represent the interests of the group.

#### **Motivational talk**

In a role play, the participant has to convince someone to carry out an unpleasant task, to

resign himself/herself to a situation or not to give up in a difficult situation.

#### **Leaderless group discussion II**

The group chooses a topic and is then split into a pro- and contra-group. In the discussion that follows, one party has to convince the other of the value of their arguments.

#### **Short cases**

Each participant is given at random three delicate situations taken from everyday activities of a professional officer. He then explains how he himself would behave in such a situation.

#### **Oral presentation**

The candidate gives a fifteen-minute lecture on a specific topic taken from military pedagogic. The candidate is given the topic as well as additional literature on the topic already at the beginning of the ACABO; he can then use his free time between the exercises to prepare his presentation.

#### **Proficiency tests**

The participants take three standardised proficiency tests on numerical, verbal and figural issues.

#### **Self appraisal**

During their free time the candidates have to work out a self appraisal. Based on a certain number of guidelines, they should find out and analyse their strengths and weaknesses. The result is not assessed but it is used as an additional source of information for the feedback talks.

The behavioural dimensions which have to be clearly defined and relevant to the requirements as well as the realistic exercises form the framework in which the observers can gather their raw material to assess the candidates.

### **3. The assessment process**

The observer team is composed of superiors and chiefs of training who are recruited above all from divisions which have sent AC candidates. They are backed by militia officers who - owing to their civilian job - are closely familiar with personnel selection and human resources management.

During the three-day Assessment Center, each participant is appraised by several observers. A watchful eye is kept on the fact that during the whole process observation and appraisal are strictly kept apart. The assessors and the



scientific staff are responsible for the strict observation of these principles.

At the end of the AC an appraisal matrix for each participant is established, which is then discussed during the observer conference. Finally a consensus-based decision is taken. A positive result is a decisive requirement for the admission to the courses of the SMC-studies. The observations made during the assessment centre are then included in a structured report and shown to the candidate during a personal interview. The results of the Assessment Center could be expressed by the qualification „passed“ or „failed“. Yet an equally or even more important part of the procedure is the discussion in which the superior explains the ratings and shows the candidate a plan of action to improve his behaviour. This procedure clearly demonstrates the human-oriented attitude on which the ACABO is based.

Before each ACABO observers and assessors are prepared for their demanding task in a task-oriented training. The following items are important:

- assessment procedure and correct handling of the forms,
  - adding personal remarks,
  - tendencies which are frequent with observers and measures to counter them,
- and in view of the observer conference
- chances and dangers of group decision processes.

It should have become clear that the quality of an appraisal system depends on the acceptance and handling of those who are involved. The procedure itself can only convince all persons involved when it is constantly subjected to a critical quality control.

#### 4. Evaluation

From the start the persons responsible for the ACABO have constantly and comprehensively evaluated the system in order to detect errors and to improve the procedure. This evaluation is never completed given the fundamental decisions which are taken at the ACABO and the scientific standards which are the frame of reference for any assessment center user.

A great importance is given to the view of the candidates. As long as they have the impression of having undergone a fair and job-oriented procedure, they will accept the results and the

recommendations. The feedback resulting from a survey done immediately after the completion of ACABO is over all very positive.

- More than 80% of the 250 participants so far think that they had sufficient occasion to show their strengths during the Assessment Center.
- Over 90% of the candidates indicate that - apart from the normal tensions experienced in an exam-like situation - they felt quite comfortable during the three-day AC.
- 95 % of the ACABO candidates consider the exercises realistic. So far no candidate has said that he had to undergo a procedure which was not practice-oriented.

Since 1998 opinions regarding the final report have also been gathered. It is important and good to hear that no one has had the impression that that he was misjudged in the final report. It seems that candidates have experienced the ACABO as a test procedure where serious thought is given to their behaviour. Consequently the confidence in the appraisal that follows the AC is very strong.

The survey done with the candidates records vital aspects of the social validity. It is easy to do and to evaluate. The results show if it is possible to carry on or if specific changes are necessary. The candidates must feel that their personalities are treated in a fair and systematic way. If this were not the case, the procedure would lose contact with reality and fundamental changes would become inevitable.

In 1995 a major study of validity was carried out. The results regarding construct and criteria validity were within the frame of acknowledged research in this area. Specific results from the study had not only consequences for the ACABO. Lessons learnt are now also applied for the appraisal procedure in everyday military life.

Another empirical test was carried out in 1998. The subjects of the test were the interrater reliability and the behaviour of the observers. Results and consequences were presented and discussed in the following assessor and observer training. Further improvements could be reached through practical exercises and a more detailed description in the assessor documents.

#### 5. Outlook

ACABO has proved its practical worth as a selection instrument. Acceptance with personnel

managers and superiors is high. It is currently the instrument which is scientifically the best founded in the whole management development process for professional officers in the Swiss Army.

Training and education of the professional officer in Swiss Army XXI will change. Qualities such as „ethic attitude“ or „cultural competencies“

might become more significant. Besides continuous improvements based on theory and practice it is therefore vital to anticipate such developments. An instrument for selection and potential appraisal would miss its target if it didn't consider developments which are showing on the horizon.

## Officer Selection in the Danish Armed Forces

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### Abstract

This paper reviews the psychological part of the present selection process which include intelligence, ability and knowledge tests, a group exercise and interviews by psychologists. The result of the psychological assessment is presented for the selection board. Together with results from tests of physical proficiency and the ratings from the candidates' military service, the selection board will use the psychological report as the basis for the final decision.

The results of two studies of the system utility are presented: An investigation of the predictive validity showed that it is possible to forecast the examination result of the officer training with a rather high precision. The investigation showed that it was possible to calculate a prognosis for the examination result from the Officer Academy, where the multiple correlation coefficient with the actual examination result is 0.57 for those, who complete the officers training. Another follow-up study showed that the promotion percent of the officers was rising with increasing psychological assessment.

### Introduction

Denmark has a compulsory military service and the Danish defence relies on mobilization. In peacetime, the active forces are a mixture of commissioned officers, professional noncommissioned officers (NCO) and soldiers, conscripts (officers, NCOs and privates) and civilians. The population of Denmark is 5,310,730 (October, 1998).

Personnel (approximate figures for 1999):

Officers	4,170
Professionals -NCOs and privates	13,012
Conscripts	7,925
Civilians	9,103
Total peacetime	34,210
After mobilization	81,200
Home Guard	64,000

Psychological selection of officer candidates in Denmark started shortly after the foundation of the Danish Armed Forces' Psychological Division in 1952; the division is now a part of the Danish Defence Centre for Leadership. The Danish officer selection procedure is an assessment centre and had its origins in the British War Office Section Board (WOSB) system, introduced in Great Britain during World War II. The WOSB combined paper and pencil tests with observation of the candidates in group situations and individual interviews. The WOSB model was introduced in Denmark in 1952 and has, of course, been modified since then. The use of group situations has been greatly reduced; today, it is primarily a leaderless group discussion. Psychiatrists have never been used in Denmark for this kind of task; most of the assessment work is done by trained military psychologists. The tests are, with few exceptions, of Danish origin, constructed by the Psychological Division, and have been revised several times.

There are three separate officer academies in Denmark (Army, Navy and Air Force). There are minor differences between the selection procedures for these three academies. Applicants for pilot training, which in Denmark include an officer training, have special admission requirements and are going through some simulationbased psychomotoric tests. The following description deals with the common elements in procedures to the three academies.

Candidates for officer academies in Denmark may enter the Armed Forces in one of the following ways:

- as a conscript
- as an enlisted private
- as a reserve officer
- as a directly recruited officer candidate trainee

Whatever the actual recruitment avenue, a certain amount of systematic selection processing will have already taken place, either at the draft station or at the Armed Forces Recruitment Centre. These initial selection procedures include medical and physical testing and varying amounts of psychological testing and

interviewing. Therefore, a certain amount of pre-selection will have taken place.

There are about 1,000 officer applicants each year and the officer academies have a total intake of about 220 cadets per year. Applicants should be undergraduates and they must have qualified for training as NCOs; if they are already NCOs, they must have complete their NCO training successfully and have performed for some period of time to the satisfaction of their superiors. Other admission requirements are:

- 18 to 25 years of age
- Danish citizenship
- a general certificate or equivalent with good grades in Danish, English and mathematics
- a strong constitution
- be at least 157 cm tall without shoes
- be able to pass a physical fitness test (run at least 2300 m in 12 minutes and pass a muscular strength test)
- be able to pass the officer selection procedure

The applicants are evaluated through the following procedure:

- intelligence, ability, and knowledge tests
- a leaderless group exercise
- a short psychological interview (30 minutes)
- a long psychological interview (60 minutes)
- a conference where the psychologists reach agreements about the evaluation of the candidates
- physical fitness test
  - an interview by an officer from the Officers Academy
- the selection board

### The officer profile

Some of the important personality traits that are assessed in officer applicants are:

- General personality traits in the officer profile:

#### *Indications of undesirable mental disorders:*

- Mental suffering
- Adjustment difficulties
- Irrational/incomprehensible behavior
- Unpredictable behavior
- Loss of control

- Inexpedient originality and unconventionality
- Repulsive appearance
- Offence against regulations and standards of behavior

#### *Indications of desirable mental health:*

- Positive and realistic self-concept
- Goal-directed behavior
- Independence
- Realistic perception and interpretation
- Personal growth and self-realization
- Social competence and energy

- Specific personality traits in the officer profile:

#### *Fitness for study*

- Intellectual capacity
- Knowledge/proficiency
- Motivation for studying

#### *Leadership potential:*

- Analytical power
- Judgement/discernment
- Breadth of view
- Initiative
- Energy
- Perseverance
- Flexibility
- Personal power
- Resolution
- Ambition to lead
- Ability to co-operate
- Sensitivity to other people/empathy
- Situational awareness/alert to social environment
- Ability to communicate
- Self-confidence
- Assertiveness
- Humor
- Stress resistance
- Potential for further personal development

As the candidates are about 20 to 24 years old when they apply for the officer academy, the development of their personality has not finished. The

target of the psychologists is to evaluate the potential for personal development and growth in the context of military service.

### The selection instruments

The first step in the selection procedure is psychological testing. A set of paper and pencil tests are used:

#### *Intelligence tests*

Logical-abstract reasoning, verbal skills, numerical skills and spatial reasoning

#### *Mathematics test*

Arithmetic and mathematical skills on an undergraduate level

#### *Language tests*

English and Danish grammar, vocabulary, and text understanding

#### *Technical/mechanical comprehension test*

Understanding of technical and mechanical matters

#### *General knowledge test*

Cultural, political, historical, and scientific knowledge

#### *Personality test*

#### *Self-report questionnaire*

If the applicants do not perform up to the standard on these tests (except for the personality test, which is used by the psychologist to make hypotheses for the interview), they are excluded from further processing. The "surviving" applicants go on to the next step in the selection procedure, which contains the following elements:

A. A leaderless group exercise (90 minutes) supervised by the three psychologists attached to each batch of six candidates. In this group exercise, the candidates are assessed on their ability to co-operate, their social skills, their sensitivity to other people, their energy, and their initiative.

B. A short psychological interview (30 minutes) focussing on military experiences.

C. A longer psychological interview (60 minutes) about upbringing, schooling, job experiences, interests, social relations, motivation and career intentions.

Each candidate is interviewed by two psychologists; one for the short interview and one for the long interview. The psychologists have access to all test results and other information on the candidate. After the interviews, the psychologists discuss the case of each candidate until consensus is reached. The psychologists evaluate the candidate's personality to see if it will fit the officer profile.

### The decision process

The end product of the psychological selection process is an approximately three quarter page verbal personality description and suitability evaluation, as well as quantitative ratings. The targets of the psychological assessment are twofold: to predict success in academic training (*the training prediction*) and to forecast how well the candidate will be able to perform as an officer after graduation from the academy (*the career prediction*). The results of the psychological assessment are presented to the selection board. The chairman of the selection board is an officer, appointed by the Army, Air Force, or Navy Command. Typically, the chairman will be the commander of the Officer Academy or his second-in-command.

Together with the results from the tests of physical proficiency and the ratings from the candidates' military service, the selection board will use the psychological report as the basis for the final evaluation. The chairman of the board makes the final decision. He can decide against the psychological report; this happens in only a few cases, for example, when the ratings from the candidate's military superiors seem to contradict the psychological evaluation.

### The system utility

The attrition rate from the academies is very low, less than 10 %, which is less than what is seen in most civilian training and education centres such as universities, nursing schools, or the police training school. This is taken as partly as proof of the effectiveness of the selection procedure and partly as proof of the effectiveness of the education at the officer academies. Data from the selection process are recorded in order to compare these data with the examination

results of the cadets and to evaluate the validity of the measurements of the selection procedure.

An investigation of the predictive validity showed that it is possible to forecast the examination result of the officer training with a rather high precision.

The investigation included 4 classes from the three Officer Academies, a total of 489 cadets. By comparing the actual examination results with different data (previous examination results and results from the selection tests) from the selection procedure the following correlation coefficients were found:

<u>Selection data:</u>	<u>Correlation coefficient:</u>
Examination result from the NCO-training	0.30
Upper secondary school leaving examination	0.28
IQ test (verbal, mathematical, spatial and analytical)	0.30
IQ test (logical-abstract reasoning)	0.25
Danish spelling test	0.22
Danish vocabulary test	0.24
General knowledge test	0.10
English grammar and vocabulary test	0.26
Mathematics Test	0.35

Through a multiple regression analysis it was possible to calculate a prognosis for the examination result from the Officer Academy, where the multiple correlation coefficient with the actual examination result is 0.57 for those, who complete the officers training. If all the rejected attendees had had the possibility to get an examination result, the correlation for all attendees would be a little higher. The correction for the restricted range shows that the right correlation can be estimated to approximately 0.64.

To test the validity of the *career-prediction*, a follow-up study was done on all commissioned army officers trained from 1953 to 1963. The criterion used was whether the individual officer, 25 years after completion of officer training, had or had not been promoted beyond the rank of major. On average, 32% of these officers were promoted to Lieutenant Colonel. The table gives the proportion of officers with a given psychological assessment promoted to Lieutenant Colonel.

### Psychological Assessment and Promotion

	Psychological Assessment							Total
	2-3	4	5	6	7	8	9	
Number of officers	17	63	89	84	75	33	7	368
Percent Promoted	24	19	27	29	40	55	57	32

As is seen in the table the promotion percent is rising with increasing psychological assessment. Only the 17 officers who despite low psychological assessment (2 = unfitted, 3 = not very fitted) was admitted to the Officers Academy surprised with a higher promotion percent than expected.

With these data in mind, there are no strong reasons for making any radical changes to the psychological assessment procedure.

## The Psychological Selection of Officer Candidates in Austria

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### Summary:

Austria's psychological officers' selection is an integral part of the selection procedure for officers' training, which lasts for more than a year. During this psychological selection, which takes 22 hours, due to the use of selected stressors and a sleepless night not only intelligence and personality traits can be tested but also (by applying the concept of "Ergo-Psychometry") individual stress resistance.

Austria's military defence is based on obligatory national military service (Conscription System) for men., which is composed of 7 months basic service and 30 days 3 - 4 refresher training periods every two years. All male citizens are subject to the draft. So all young men are called up for mustering at an *induction centre*. Here they are examined as to whether they are fit for duty in physical and psychological respect. The psychological examination there is only a basic one - but for officer candidates it's the first selection step, they have to prove, that they are able to meet certain requirements. They need a qualification called "Maturity Examination" (entrance examination for college) and their physical and psychological performance must be better than that of other conscripts.

After this pre-selection every year in October approximately 800 officer candidates (Career and Reserve together) are inducted and sent to special training units as "One-Year-Volunteers" (they have to enlist for 6 additional month after the 7 months national service). In these units they receive 4 months basic and general military training.

During these 4 months all candidates must pass the "Psychological Officer Selection Test"

This rather long period is due to the fact that on the one hand there is a large number of candidates (800) and not enough psychologists, on the other hand certain psychological quality-standards have to be met.

This together with the necessity to fulfill the expectations of the military concerning a practice-orientated test system and the need to have the results for immediate disposition resulted in the following system:

### Framework:

- Duration: 1 day (and one night) - 1400 hrs to 1200 hrs
- Max. number of candidates: 30
- Location: Military Installation
- Personnel: 1 Psychologist; 1-2 Assistants; Military Training Personnel
- Computation and Evaluation of Data: Immediately; computer-assisted
- Additional Aspects: 3-4 turns per week are possible (90 to 120 persons)

In cooperation with the military leadership and training experts we listed the *following abilities and properties*, which we think are indispensable for an officer and which are not only accepted by the military but can also be tested under the above mentioned conditions:

### Intelligence:

First of all it is necessary to test some basic traits of intelligence. We found that general and verbal intelligence, reasoning and memory, have a high prognostic value. Other traits, such as concentration, perception, precision and practical intelligence (the ability to understand and perform complicated orders), we summed up as "Performance-Potential" and we know that this is very important for selection.

### Stress Resistance:

Since it is nearly impossible to simulate all kinds of stress realistically, we decided to reduce the criteria for stress resistance to those, which can really be tested during the officer selection test and which correspond to the demands of field commanders. Last, but not least, they enable us to use "Ergo-Psychometry". The concept of Ergo-Psychometry postulates, that tests under load are more valid than tests under neutral conditions. The testing of stress resistance comprises

- sleep deprivation (one night)
- physical load (march and physical exercises)
- mental stress (primarily produced by sound)
- frustration (comparison between parallel - tests under neutral and under frustrating conditions) and

social exposure (to talk for a few minutes on a given topic without preparation, while critically watched by fellow-candidates and psychologist)

Ergo-Psychometry is used in the following way: Psychometric tests (Intelligence) are given firstly under neutral conditions, but are repeated in a parallel form after the sleepless night and tiring under mental stress. Even personality questionnaires have to be filled in after this exposure to stress. We have experienced, that under such conditions the candidates are too tired to control their answers in respect to social desirability.

#### **Personality:**

The main instrument for the testing of personality traits are two questionnaires. One is a commercial product, (Personality Research Form - PRF), the other was developed by our service to get traits and attitudes, which might influence directly the motivation for military service and the wish to become an officer. Also the behavior of the candidates during the test is critically watched by the psychologist. Especially while they work under physical and mental stress the psychologist may notice some peculiarities in behaviour. Lastly he has the possibility to complete and sum up all his information during a psychological interview. He then has to judge personality traits such as

- Emotional Stability,
- Social Competence and
- Motivation for being an officer

We assume that, even if under the given conditions we are not able to test all required abilities and properties as completely as we would want to. But we are certainly able to fulfill the principal demand of the military leadership: *To filter out the worst and to give an important contribution to further assessments.*

#### **The psychological officer's selection test system:**

Below the sequence of the individual tests of the psychological officers' selection system is described:

The officer selection test system *lasts 22 hours* - it starts at 1400 hrs and ends at about 1200 hrs the next day.

The *first part* lasts from 1400 to 1700 hrs: The candidates are tested with psychometric intelligence tests (paper pencil method, the data are calculated and rated by computer) - the test situation is neutral, there is no additional load.

From 1800 to about 2200 hrs the second part of the test takes place: Here we have qualitative tasks, which have the function of telling the psychologist something about attitudes and social and personality traits. For example the candidates have to state in written form the reasons, why they want to become officers, they have to complete sentences with special references, they have to talk for a short period on a given topic and discuss it, they have to reflect on their views on life, and similar tasks.

During the following night hours (2200 to 0500 hrs) the candidates are prevented from sleeping and they have to march a given distance and do written and physical exercises in between: By morning each of them should be stressed up to approximately 50 % of his physical and mental capacity. This is necessary for the next parts of the test.

From 0600 to 0800 hrs the candidates have to work out the personality questionnaires (as explained above). We have good reason to suppose, that their answers are more valid after the stressful night.

From 0800 to 1000 the parallel forms of some of the tests from the first part are given to the already very tired candidates, but now, according to the principles of Ergo-Psychometry, under load (noise and other stressors). The comparison between the neutral results and those after a sleepless night and additional mental stress help to determine individual stress resistance.

The *last part* of the test (1000 to 1200 hrs or longer) consists of interviews by the psychologist. Due to the computer-assisted rating and calculating of the data, the psychologist can be supplied with all the information for the test-period of all candidates (even with a rating proposal) by this time. After the interview with each aspirant he has to decide on the final ratings.

#### **The possible qualifications are**

- Well Qualified
- Qualified (the majority)
- Conditional qualification and
- Failed.

"Conditional Qualification" is given, if some weaknesses of a candidate could be compensated by good motivation or other strong points. In this case the commanding officer of this candidate has to assess the candidate's performance critically and finally decide, whether the aspirant should continue officers' training or not.

If the candidate fails the test, he is removed from officers' training and reassigned to another unit.

At the end of January the candidates have to pass the Reserve Officers' Examination Part I. For the rest of the "One Year Volunteer Training" Career and Reserve Officer Candidates are separated.

#### **Career Officer Candidates**

The Career Officer Candidates are sent in February on the so-called *Preparation Semester for the College for Military Leadership at the Military Academy*. During this semester they receive specialized infantry training and their level of proficiency is standardized.

Because the number of participants is limited, they have to undergo at the end of the Preparation Semester *assessment* for admittance to the College.

The criteria for this assessment are:



- relevant professional qualification and experience
- experience in military training
- physical fitness
- stress resistance
- social competence
- leadership potential
- adherence to democratic values
- foreign languages

This examination system is rather new and so the development of the methods and their evaluation has not been completed until now. Our Service and its psychologists take part in this development.

Finally a board consisting of field commanders, experts and psychologists has to fix the final qualification of each candidate by summing up all available ratings *including the result of the psychological officer selection test.*

If a candidate passes this assessment, he has to go on to a Practice Semester with an infantry unit. There he has to train and command an infantry squad. If he is successful, he can then enroll for officers' training at the College for Military Leadership, which lasts 3 years, after which he is graduated to Master of Military Leadership and promoted to 2<sup>nd</sup> Lieutenant.

#### **Reserve Officer Candidates**

At the beginning of February the Reserve Officer Candidates are transferred to the various branch schools. There they undergo specialized training specific for their arm or service and their individual function. At the end of August they have to pass the Reserve Officers' Examination Part II. The board is obliged to take into account the results of the psychological selection test when fixing the final rating.

Those, who have passed this examination continue their training until September. They receive practical training as squad leaders and they are introduced to their tasks as future officers. After having finished the One-Year-Volunteer-Training they can continue their military career by volunteering for the necessary reserve training courses. At earliest 4 ½ years after being inducted, the Reserve Officer Candidate can be promoted to 2<sup>nd</sup> Lieutenant.

## Development of a Personality Test Battery to be Used in Officer Selection in the Turkish Armed Forces

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### Summary

This study is an earlier step in the development of a personality test battery to be used in the selection of officers recruited from outside sources in the Turkish Armed Forces. Prior to this study, five personality dimensions were identified as being relevant for the job military officer. Items tapping into these dimensions, or more specifically tapping into the attributes loading under the identified dimensions were developed. The test battery was piloted on a group of officers ( $N = 519$ ). Revisions in the items were made based on internal consistency estimates. Exploratory factor analyses following these revisions led to further refinements in the battery, and consequently to identification of 18 subdimensions under the five factors that were considerably consistent. Furthermore, a preliminary test of the five-dimension model of personality was conducted using a confirmatory factor analysis. Limitations of the research as well as the steps to be followed are described.

### Introduction

Hough and Schneider (1996) define the current zeitgeist of industrial and organizational psychological research as a "trait-friendly" environment. Increasing attention is being focused on individual differences variables other than cognitive ability in understanding organizational performance and behavior. Murphy (1996) identifies three noncognitive individual differences domains that could be effective in organizational performance: personality, affective disposition (mood, affect, and temperament), and orientation. This author argues that the boundaries between the domains are often obscure, and personality seems to be the overarching construct among the three.

Empirical evidence has accumulated concerning the criterion-related validity of specific personality variables in predicting a number of performance criteria (e.g., Barrick & Mount, 1991; Borman, Hanson, & Hedge, 1997; Hogan, Hogan, & Roberts, 1996; Hough, Eaton, Dunnette, Kamp, & McCloy, 1990; Ones, Viswesvaran, & Schmidt, 1993). The Five-Factor Model of Personality deserves a significant credit in the emergence of interest in personality variables as predictors of job performance. Literature suggests significant relationships between the Big Five personality dimensions and job performance. In their meta-analysis of the literature on the personality-job performance relationships, Barrick and Mount (1991) found that Extraversion was a valid predictor of job performance for managerial and sales jobs and that Conscientiousness was a valid predictor of job performance for all occupations. Cross-cultural evidence concerning the validity of the Big Five personality dimensions is also accumulating. For example, in a meta-analysis of research on the Five-Factor personality dimensions and job performance in the European Community, Salgado (1997) reported that Conscientiousness and Emotional Stability were valid predictors of job performance across occupational groups.

In a more recent meta analysis, Mount, Barrick, and Stewart (1998), investigated the relationship between the Big Five dimensions and performance in jobs involving interpersonal interactions either with customers or with other employees. The results suggested that Conscientiousness, Agreeableness, and Emotional Stability were positively related to performance. Furthermore,

Agreeableness and Emotional Stability were more strongly related to performance in jobs that involved team work than in those requiring dyadic interactions. Based on these results, in another recent article Mount and Barrick (1998) argued that the Big Five personality dimensions other than conscientiousness were meaningfully related to criteria, but their predictive power was more situational specific than that of Conscientiousness.

Despite the mounting evidence concerning the potential of personality variables in predicting job performance, personality variables have in general been overlooked in personnel selection practices. One possible reason for this seems to be the commonly used job analytic procedures that do not encourage the consideration of personality variables (Sumer, Sumer, & Demirutku, 1999). Most job analysis techniques identify the criteria for effective "task performance." However, performance domain is expanding and task performance by itself seems to be deficient in representing the domain of job performance (Arvey & Murphy, 1998; Borman, Hanson, & Hedge, 1997). A distinction has been made between task and contextual performance (Borman & Motowidlo, 1993). Task performance can be defined as the proficiency with which activities that are prescribed and formally recognized for a job are performed. Contextual performance, on the other hand, refers to interpersonal and voluntary behaviors that contribute to the enhancement of social and motivational context in which the work gets done. Contextual performance comprises discretionary behaviors such as organizational citizenship, volunteer and cooperative behaviors, and helpful acts. Studies suggest that attributes that lead incumbents to do well in task performance are different from those that lead incumbents to do well in contextual aspects of performance (e.g., McCloy, Campbell, & Cudeck, 1994; Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996). For example, Motowidlo and Van Scotter's findings indicated that both task performance and contextual performance contributed independently to overall job performance, and that personality variables were more likely to predict contextual performance than task performance. Consistently, Conscientiousness, which has been shown to be meaningfully related to different job performance criteria for a range of jobs (Mount & Barrick, 1998), seems to be more related to motivational/contextual aspects of performance than task/ability aspects of performance (Mount & Barrick, 1995). Borman et al. (1997) argue that in

majority of the studies examining the relationship between job performance and personality variables overall, job performance ratings have been used as indices of performance which weight both technical/task and contextual performance. Thus, validities of personality measures might be even higher when contextual elements of performance can be measured separately.

Recently, the bandwidth of personality measures used in personnel selection has been a source of disagreement among researchers in the field of industrial and organizational psychology (e.g., Asthon, 1998; Borman et al., 1997; Hogan & Roberts, 1996; Ones & Viswesvaran, 1996). Ones and Viswesvaran advocate the use of broader and richer personality traits, such as integrity, rather than narrower and fine-grained personality traits in personnel selection. They present evidence supporting the power of broader personality variables in predicting job performance. However, there exists empirical evidence suggesting that broader personality constructs are not necessarily better. Hogan and Roberts discuss examples of narrower personality traits predicting specific job performance better than broad traits. Similarly, Asthon reports that two narrow measures of personality, responsibility and risk taking, have higher validities than the Big Five dimensions. Borman and colleagues present studies further supporting the predictive power of narrow band traits even when global measures of performance are used.

We believe that along with personality variables that have been shown to possess generalizable validities, military jobs are likely to call for personality attributes that are job specific and not necessarily demanded by nonmilitary jobs. Most military jobs are carried out in situations that are physically and psychologically stressful and demanding. Properties such as order, discipline, secrecy, and respect for the chain of command, and leadership are much more valued in military jobs than they are in most civilian jobs. Borman and Motowidlo (1993) developed a model of "soldier effectiveness." According to this model, soldier effectiveness involves three dimensions: *Determination*, *Teamwork*, and *Allegiance*. Determination includes behavioral indicators such as perseverance, reaction to adversity (stress tolerance), conscientiousness, initiative, and discipline. Teamwork embraces cooperation, camaraderie, concern for unit goals, boosting unit morale, and leadership. Finally, Allegiance includes

indicators like following orders, following regulations, respect for authority, military bearing, and adjustment to the army. Soldier effectiveness refers to more than just performing assigned job duties effectively, it refers to going beyond the prescribed duties. Elements contributing to soldier effectiveness are common to nearly all soldiering jobs in the army

The research presented in this paper represents initial steps involved in the development of a personality test battery to be used in the selection of officers into the Turkish Armed Forces (TAF). The TAF recruits officers from two main sources: military schools and outside sources. Officers recruited from outside sources are in fact professionals with at least a B.S. or B.A. degree. In the selection of these officers, personality tests are in general used to supplement data obtained from other selection devices. The personality tests in use in the TAF are adopted versions of the tests that are Western in origin, and there is a growing need for both culture and job specific personality tests to be used in personnel selection.

Developing a personality test battery that is both culture and job specific requires a thorough examination of the jobs in question. The jobs need to be analyzed so that criteria for contextual aspect of performance, that is personality attributes required in the job, can be identified. This is what we have done before this study. In two consecutive studies, also presented at this workshop (Sumer, Sumer, & Demirutku, 1999), personality variables to be considered in the selection of officers were identified. In the first of these studies personality-oriented job analytic interviews were conducted with a total of 78 currently employed or former officers, 70 currently employed officers (62 from outside sources and eight from military schools) and eight former officers leaving the military during their one-year probationary period. Content analysis of these interviews along with a detailed examination of available written documents, such as performance appraisal forms, led to the identification of noncognitive individual differences variables (mostly personality attributes) as being relevant for the job of officer in the TAF. In the second study, 447 officers of both type rated the relevance and importance of each of the identified attribute for the job of a military officer on a 9-point Likert type scales. Resulting weighted relevance scores (relevance rating X importance rating) were subjected to principle component analysis with the purpose of identifying major

personality constructs relevant for the job in question. Data suggested existence of five major components: *Conscientiousness/Self-Discipline, Military Factor (M-Factor), Self-Confidence, Agreeableness-Extraversion, and Leadership* (See Table 1).

Conscientiousness consisted of 19 items and explained 37% of variance. It included attributes like, job-specific knowledge, work discipline, time management, planning, and perseverance. Thirteen items loaded on the *M-Factor*, and these items were mostly specific to the military context, such as respect to military hierarchy, military discipline, orderliness, and strength of character. *M-Factor* was very stable; almost the same structure emerged regardless of the rotation and the extraction method employed in the analyses. *M-Factor* explained the 4.51 % of variance. Self-confidence contained five attributes that tapped mostly self-assurance, like courage, risk-taking, and discretion. This factor explained 2.88% of variance. The forth factor, *Agreeableness-Extraversion*, included 11 items, such as interpersonal relations, sociability, empathy, agreeableness, and assertiveness, that appeared to represent a combination of two of the Big-Five dimensions: *Agreeableness* and *Extraversion*. It explained 2.86% of the variance. The final factor, *Leadership*, included nine attributes that were again context or job specific, such as achievement motivation, persuasiveness, and foresightedness. This factor explained only 1.95% of the variance.

In the present study, an initial test battery assessing these five personality dimensions and their subdomains, identified in earlier steps, was developed and tested. This study is believed to be a major step in the development of a valid personality test battery to be used in the selection of officers in the TAF.

## Method

### Construction of an Initial Test Battery

Before item development, an extensive review of the literatures on personality and selection, military selection, personality tests and social desirability, and personality bandwidth controversy was conducted. Personality inventories commonly used in personnel selection, such as the Revised NEO Personality Inventory (Costa & McCrae, 1995), and the items in the 1412 International Personality Item Pool (IPIP, 1999) were examined. The project team started developing items that were believed to

be representative of the five personality dimensions, more specifically attributes under each dimension identified in the earlier steps. In item development, two conditions were tried to be met. First, when possible items were expressed in behavioral, as opposed to attitudinal terms. Second, where possible, items were made less prone to social desirability effects by asking potential respondents to indicate a preference between two equally desirable alternative courses of actions.

For each dimension, items developed by different members of the project team were pooled together on a computer file. The list of items for a given dimension was then reviewed by the team in a series of group sessions. In these sessions, based on discussions, some items were revised, rewritten, or eliminated. Relatively more items were developed for attributes/subdimensions that were believed to be marker for the dimension in question and/or for attributes with a strong loading on a given dimensions. An initial list of 279 items were developed.

#### **Reallocation of Items by an Independent Group of Judges and Revisions**

Eight judges, four psychology instructors and four psychology graduate students were asked to sort the items into previously established categories. Specifically, the judges were given 1) the list containing 279 items and 2) the five personality dimensions and their definitions. The definitions of the dimensions were written such that they reflected the contents of these dimensions (i.e., attributes loading under these dimensions/factors). For each item, the judges were asked to indicate the dimension of which it was the most representative. One of the judge's sortings were eliminated because for each item she indicated at least two, and mostly three or four dimensions. The remaining judges' sortings of items were examined and items on which more than half of the judges (four out of seven) were not able to agree (concerning category the which the item belonged) were excluded from the list.

Fifty-eight items were eliminated because of disagreements among the judges. The remaining 221 items were reexamined by the project team. As a result of this reexamination, some items were revised and 21 new items were developed to represent attributes or subdimensions that were underrepresented. Resulting 242 items,

representing 50 subdimensions, constituted the test battery to be piloted.

#### **Participants**

The original sample consisted of 800 officers in the TAF. Of the of 800 officers receiving the questionnaire, 573 responded, resulting in a response rate of 71.6 %. Among the returned surveys, 19 surveys were eliminated because they contained incomplete information. Furthermore, 35 cases were identified as outliers and hence were eliminated from the analyses. The remaining 519 participants (Army = 95, Navy = 149, Air Force = 177, Gendarmerie = 98) constituted the final sample of this study. In the final sample, there were 465 males, 50 females, and 4 participants with missing data on sex. Two hundred-sixty-three of the participants were officers from the military schools, whereas the remaining 256 were from outside sources. The officers in the final sample had a mean age and experience of 34.4 years and 148.9 months, respectively.

#### **The Questionnaire and Procedure**

The questionnaire containing 242 items and a set of demographic questions were administered to the participants in the sample. For each item, the respondents were asked to indicate the extent to which they agreed with the statement on a 6-point Likert type scale (1 = Absolutely disagree; 6 = Absolutely agree). Approximately half of the items in the questionnaire were reverse coded. In addition to these ratings, participants answered a series of demographic questions of interest. The questionnaires were sent to and received from the officers using the internal mail system.

#### **Analyses and Results**

Prior to analyses, the data were subjected to screening and cleaning. Out of 573 returned questionnaires, 19 eliminated from the analyses because they were unfinished. Furthermore, of the 554 usable questionnaires 35 were eliminated from the analyses because they included univariate outliers. A respondent was determined to be an outlier if he/she had a z-score above 3.20 on at least 4 items. Exclusion of such outlier cases reduced the sample size to 519 participants.

In order to judge the quality of the items, a two-step procedure was followed. In the first step, items that were presumed to represent a subdimension of one of the five personality factors were grouped together, and internal consistency reliabilities were calculated for each subdimension. After

examination of inter-item correlation matrices, item-total correlations (ITC), and squared multiple correlations (SMC) for each subdimension, the items with ITCs lower than .20 and SMCs lower than .10 were excluded from the analyses if the exclusion of the item improved the internal consistency of the subdimension considerably. In the second step, the remaining items of each major personality dimension (e.g., *M-Factor*) were subjected to factor analyses to explore whether the expected subdimensions would emerge. Thus, **five separate factor analyses** with varimax rotation were performed.

The factor analyses in general did not produce the presumed subdimensions. However, examination of the factor structures revealed that items representing two or more subdimensions merged together to form a factor. Therefore, those subdimensions with items grouped under the same factor were combined. Subdimensions including low-communality items, and items with a factor loading below .30 were eliminated for the time being. Following these refinements, 18 new/enriched subdimensions (consisting of 133 items), representing the five personality dimensions were identified. Correlation matrix of the remaining 18 subdimensions, internal consistency reliability coefficients, means, and standard deviations are presented in Table 2.

As Table 2 reveals, Conscientiousness/Self-Discipline consisted of five subdimensions: decision making (3 items), problem solving (3 items), verbal communication (3 items), teamwork (8 items), and work discipline (24 items). *M-Factor* was represented by three subdimensions: orderliness (7 items), strength of character (9 items), and military spirit (10 items). Self-Confidence was composed of three subdimensions: self-confidence (6 items), risk taking (2 items), and courage (3 items). Agreeableness-Extroversion was also made up of three subdimensions: empathy (4 items), agreeableness (3 items), and sociability (12 items). Finally, Leadership included four subdimensions: critical thinking (3 items), leadership (16 items), monitoring task progress (9 items), and perseverance (8 items). Table 3 presents a sample item for each subdimension.

In addition to the analyses described above, a preliminary (and perhaps immature) test of the obtained five-factor structure was also conducted. A confirmatory factor analysis was run using LISREL 8.3 (Jöreskog & Sörbom, 1996). The

measurement model consisted of five latent constructs, that is, the five personality dimensions. The indicator variables were the 18 subdimensions identified using exploratory and conceptual refinements. Sixteen of the 18 indicators loaded significantly on the expected latent constructs. The measurement model provided a modest fit to the data ( $\chi^2 (125, N = 519) = 833.37, p < .001$ , RMS = .10, GFI = .85, AGFI = .79, NNFI = .76, CFI = .80). The model suggested elimination of two indicators, agreeableness and risk taking, that had nonsignificant path coefficients.

Courage was also decided to be an inadequate indicator of the latent construct Self-Confidence. It had a significant but relatively low path from the latent variable. An examination of the correlation matrix of indicators (see Table 2) also revealed that courage had negative correlations with the indicators of the *M-Factor* that it was supposed to be positively correlated with. A detailed examination of the three items under courage suggested that these items were probably poor measures of the indicator. Therefore, courage was also dropped from the model.

Furthermore, an examination of the modification indices suggested that errors between two indicators, teamwork and sociability, be correlated. Conceptually, since sociability is facilitative of teamwork, correlated errors between these two indicators made sense. Thus, we let the errors of teamwork and sociability correlate. Finally, since the latent construct Self-Confidence was measured by only a single indicator, measurement error of the indicator was included in the model using the formula  $(1-\alpha) \times \text{variance of the indicator} = .13$ . Accordingly, the model was modified and tested again. The modified model revealed a relatively better fit to the data ( $\chi^2 (80, N = 519) = 477.64, p < .001$ , RMS = .09, GFI = .89, AGFI = .84, NNFI = .83, CFI = .87). Figure 1 illustrates the modified measurement model. A single-factor model was also tested to see whether a single-factor solution could explain the data better than the five-factor solution. As expected, results suggested that the single-factor solution was a relatively poor model as indicated by a variety of goodness of fit indices ( $\chi^2 (90, N = 519) = 822.19, p < .001$ , RMS = .13, GFI = .83, AGFI = .77, NNFI = .76, CFI = .79).

## Discussion

The present study represents an initial step in the development of a personality test battery to be used in officer selection in the TAF. At earlier steps,



five personality dimensions critical for the job of officer had been identified. In the present study, items aiming to tap into the identified dimensions, or more specifically attributes under each dimension, were developed and tested on a roughly representative sample of officers. Original revisions on the items were made on the basis of improvements in the internal consistencies of the subdimensions. These revisions were followed by **separate factor analyses** for each of the five personality dimensions. Using an exploratory approach, individual items in each dimension were factor analyzed. Factor analyses led to combining some subdimensions, further eliminating some subdimensions, resulting in an 18-subdimension, five-factor structure.

The purpose of exploratory factor analyses was to identify meaningful sets of items for each of the five dimensions. Revisions made in items and subdimensions were usually conceptual and/or data driven in nature. The revision process resulted in elimination of some subdimensions. While the initial item pool consisted of 242 items, following the exploratory analyses 109 items were eliminated, leaving 133 items under 18 subdimensions.

Measurement problems can explain why factor analyses conducted for personality dimensions did not produce the expected groupings of items. In the process of identifying the major personality dimensions prior to this study, certain attributes were found to load on a given dimension (e.g., *M-Factor*). In the present study items presumably measuring these attributes were developed. For many attributes, however, items aiming to measure the same subdimension did not correlate highly with each other, making the structure of each personality dimension difficult to interpret. As a result, many subdimensions were eliminated from the analyses. Elimination of these subdimensions, does not necessarily mean that they were irrelevant. We think that majority of these subdimensions were not measured adequately. New items measuring the eliminated subdimensions are going to be developed and tested in the following steps of this project.

One can also argue that the reason the expected subdimensions did not emerge was that the expected structure was in fact invalid. This could be a possibility especially when one thinks that interpretation of an exploratory factor analysis requires a judgemental process. We admit that the results of the original factor analysis yielding the

five dimensions needed to be interpreted with some caution. On the other hand, factor analysis is considered to be an effective tool for data reduction, and the obtained five-factor structure was conceptually sound. Furthermore, results of a preliminary confirmatory factor analysis seemed to support the expected five-factor structure. Compared to a single-factor solution, a five-factor solution had a better fit to data.

A clarification is called for concerning the use of the confirmatory factor analysis in this study. A confirmatory approach would normally be more appropriate after all the revisions and refinements on the battery have been done and the test battery has been tried on a new sample. However, knowing that the dimensions were underrepresented/not measured adequately, we wanted to see the fit of the predicted model to data. The results were in general quite promising.

An important limitation of the study presented here was a lack of control of social desirability effects or other related response tendencies. Such effects are known to confound results, making them more difficult to interpret. A control for social desirability will be incorporated into the following applications of the revised battery.

Both exploratory and confirmatory procedures suggested that measurement of certain attributes needs to be improved; new items should be developed for subdimensions not represented. Currently, we are in the process of developing new items for some of the weakly measured subdimensions (e.g., risk taking, foresightedness, and courage) for subdimensions with relatively few items. Officers representing different forces, ranks, and area of speciality will be consulted with as subject matter experts in the development of new items. The second version of the battery will be tested on another group of officers and further revisions on the battery will be made accordingly. The resulting battery will then be subjected to a criterion-validity process in which the power of the battery in predicting determined performance criteria will be examined.

## References

- Arvey, R. D., & Murphy, K. R. (1998). Performance evaluation in work settings. *Annual Review of Psychology*, 49, 141-168.
- Ashton, M. C. (1998). Personality and job-performance: The importance of narrow traits. *Journal of Organizational Behavior*, 19, 289-303.
- Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44, 1-26.
- Borman, W. C., Hanson, M. A., & Hedge, J. W. (1997). Personnel selection. *Annual Review of Psychology*, 48, 299-337.
- Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.), *Personnel selection in organizations* (pp. 71-98). San Francisco, CA: Jossey-Bass.
- Costa, P. T., Jr., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the revised NEO personality inventory. *Journal of Personality Assessment*, 64, 21-50.
- Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions. *American Psychologist*, 51 (5), 469-477.
- Hogan, J., & Roberts, B. W. (1996). Issues and non-issues in the fidelity-bandwidth trade-off. *Journal of Organizational Behavior*, 17, 627-637.
- Hough, L. M., Eaton, N. K., Dunnette, M. D., Kamp, J. D., & McCloy, R. A. (1990). Criterion-related validities of personality constructs and the effect of response distortion on those validities. *Journal of Applied Psychology*, 75 (5), 581-595.
- Hough, L. M., & Schneider, R. J. (1996). Personality traits, taxonomies, and applications in organizations. In K. R. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 31-88). San Francisco, CA: Jossey-Bass.
- IPIP. (31.08.1999). The 1,412 IPIP items in alphabetical order with their means and standard deviations. <http://ipip.ori.org/ipip/1412.htm>.
- Jöreskog, K., & Sörbom, D. (1996). *LISREL 8: User's reference guide*. Chicago, IL: Scientific Software International.
- McCloy, R. A., Campbell, J. P., & Cudeck, R. (1994). A confirmatory test of a model of performance determinants. *Journal of Applied Psychology*, 79, 493-505.
- Motowidlo, S. J., & Van Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology*, 79, 475-480.
- Mount, M. K., & Barrick, M. R. (1995). The Big Five personality dimensions: Implications for research and practice in human resource management. *Research in Personnel and Human Resource Management*, 13, 153-200.
- Mount, M. K., & Barrick, M. R. (1998). Five reasons why the "big five" article has been frequently cited. *Personnel Psychology*, 51, 849-857.
- Mount, M. K., Barrick, M. R., & Stewart, G. L. (1998). 5-Factor model of personality and performance in jobs involving interpersonal interactions. *Human Performance*, 11, 145-165.
- Murphy, K. R. (1996). Individual differences and behavior in organizations: Much more than g. In K. R. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 3-30). San Francisco, CA: Jossey-Bass.
- Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance. *Journal of Applied Psychology*, 78, 679-703.
- Ones, D. S., & Viswesvaran, C. (1996). Bandwidth-fidelity dilemma in personality measurement for personnel-selection. *Journal of Organizational Behavior*, 17, 609-626.
- Raymark, P. H., Schmit, M. J., & Guion, R. M. (1997). Identifying potentially useful personality constructs for employee selection. *Personnel Psychology*, 50, 723-736.
- Salgado, J. F. (1997). The five factor model of personality and job performance in the European Community. *Journal of Applied Psychology*, 82, 30-43.
- Sumer, H. C., Sumer, N., & Demirutku, K. (1999, November 9-11). *A person-oriented job analysis for identifying skills and personality attributes to be assessed in officer selection*. Paper to be presented at the NATO/RTA Human Factors & Medicine Panel Workshop on Officer Selection, Monterey, California.
- Van Scotter, J. R., & Motowidlo, S. J. (1996). Interpersonal facilitation and job dedication as separate facets of contextual performance. *Journal of Applied Psychology*, 81, 525-531.



Table 1  
Results of Factor Analysis of Weighted Attribute Ratings

Item	F1	F2	F3	F4	F5	h <sup>2</sup>
Job-specific knowledge	.62					.55
Problem solving	.61					.61
Work discipline	.56					.47
Fairness	.53					.48
Time management	.52					.66
Planning	.47					.50
Perseverance	.46					.59
Initiative	.46		.44			.54
Verbal communication	.45					.47
Decision making	.45				.35	.54
Managerial talent	.45					.44
Team player	.44					.56
Openness to experience	.44					.53
Stress tolerance	.43				.37	.46
Mentoring	.42					.38
Trusting others	-.39		.39	.35		.33
Thriftiness	.37					.52
Secretiveness	.36					.35
Attentiveness	.35					.50
Self-control						.56
Intrinsic motivation						.54
Rationality						.50
Respect to chain of command		.79				.59
Commitment		.78				.59
Military discipline		.77				.57
Pride in uniform		.60				.53
Superior-subordinate relations		.57				.55
Morality		.56				.45
Crisp appearance		.55				.49
Honesty		.53				.38
Pride in occupation		.50				.47
Respect for family life		.46				.44
Orderliness		.42				.56
Strength of character	.36	.39				.50
Trustworthiness		.35				.40
Knowledge of rules and regulations						.50
Adaptability						.63
Frankness			.61			.49
Courage			.53			.54
Risk-taking			.52			.40
Self-confidence			.49			.44
Discretion			.43			.35
Interpersonal relations				.66		.73
Tolerance				.65		.54

Table 1 continued

Item	F1	F2	F3	F4	F5	h <sup>2</sup>
Sociability				.65		.62
Egalitarian				.62		.49
Empathy				.61		.56
Agreeableness				.57		.57
Negotiating				.55		.55
Assertiveness				.53		.59
Culturedness				.51		.46
Consulting				.45		.58
Coordination				.44		.64
Feedback seeking				.38		.54
Self-monitoring				.37		.51
Participation				.37		.61
Practicality				.35		.42
Written communication						.51
Quality orientation						.51
Emotional stability						.29
Leadership					.53	.42
Achievement motivation					.49	.55
Persuasiveness					.44	.42
Monitoring task progress					.43	.40
Foresightedness					.42	.23
Critical thinking					.41	.49
Tolerance to frustration					.41	.50
Determinedness			.36		.37	.55
Making personal sacrifices					.35	.40
Patience					.35	.48
Tolerance to ambiguity						.14
Creativity						.59
Mannerism/Bearing						.40
Perfectionism						.43
Eigenvalues	27.63	3.34	2.13	2.12	1.44	
Explained Variance ( % )	37.33	4.51	2.88	2.86	1.95	
Internal Consistency ( $\alpha$ )	.93	.89	.75	.93	.83	

*Note.* Extraction method is Principal Component with Rotation Method of Oblimin with Kaiser Normalization. F1: Conscientiousness/Self-discipline; F2: Military (M-) Factor; F3: Self-Confidence; F4: Agreeableness-Extraversion; F5: Leadership.

Table 2.  
Subdimension Correlations, Reliabilities, Means, and Standard Deviations

Dimension	Subdimension	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Agreeableness- Extroversion	1. Empathy	.58																	
	2. Agreeableness	.03	.41																
	3. Sociability	.36	.01	.70															
Self-Confidence	4. Courage	.16	-.08	.19	.67														
	5. Risk taking	-.05	-.21	.01	.03	.35													
	6. Self-confidence	.42	-.07	.37	.27	-.09	.58												
Leadership	7. Critical thinking	.30	-.09	.16	.28	.08	.33	.55											
	8. Leadership	.55	-.11	.45	.28	-.05	.58	.36	.79										
	9. Monitoring task progress	.33	-.10	.30	.21	-.09	.48	.30	.55	.62									
M-Factor	1. Perseverance	.33	-.06	.42	.26	-.01	.56	.26	.53	.47	.63								
	11. Orderliness	.14	.09	.12	-.11	-.17	.18	.04	.21	.38	.17	.75							
	12. Strength of character	.33	-.02	.28	-.11	.05	.25	.15	.28	.37	.34	.31	.72						
Conscientiousness/ Self-Discipline	13. Military spirit	.28	.17	.27	-.08	-.23	.27	.02	.32	.38	.30	.43	.40	.72					
	14. Decision making	.35	-.14	.40	.09	-.02	.40	.26	.38	.43	.41	.29	.49	.25	.55				
	15. Problem solving	.27	-.08	.28	.08	.06	.34	.28	.38	.31	.41	.16	.53	.27	.39	.45			
	16. Verbal communication	.42	-.05	.40	.22	-.03	.49	.40	.63	.45	.45	.21	.35	.26	.39	.38	.52		
	17. Teamwork	.12	.09	.37	-.12	.02	.09	-.03	.09	-.03	.18	.01	.27	.15	.17	.18	.13	.48	
	18. Work discipline	.40	-.06	.32	-.03	-.11	.46	.22	.52	.56	.53	.49	.55	.50	.51	.43	.47	.14	.78
Mean <sup>1</sup>		4.79	4.26	4.09	3.84	2.51	4.36	4.28	4.24	4.26	4.03	4.82	4.72	4.36	4.68	4.21	4.67	3.75	4.35
SD		.55	.72	.57	.93	.81	.56	.74	.48	.54	.61	.69	.65	.63	.81	.83	.67	.52	.47

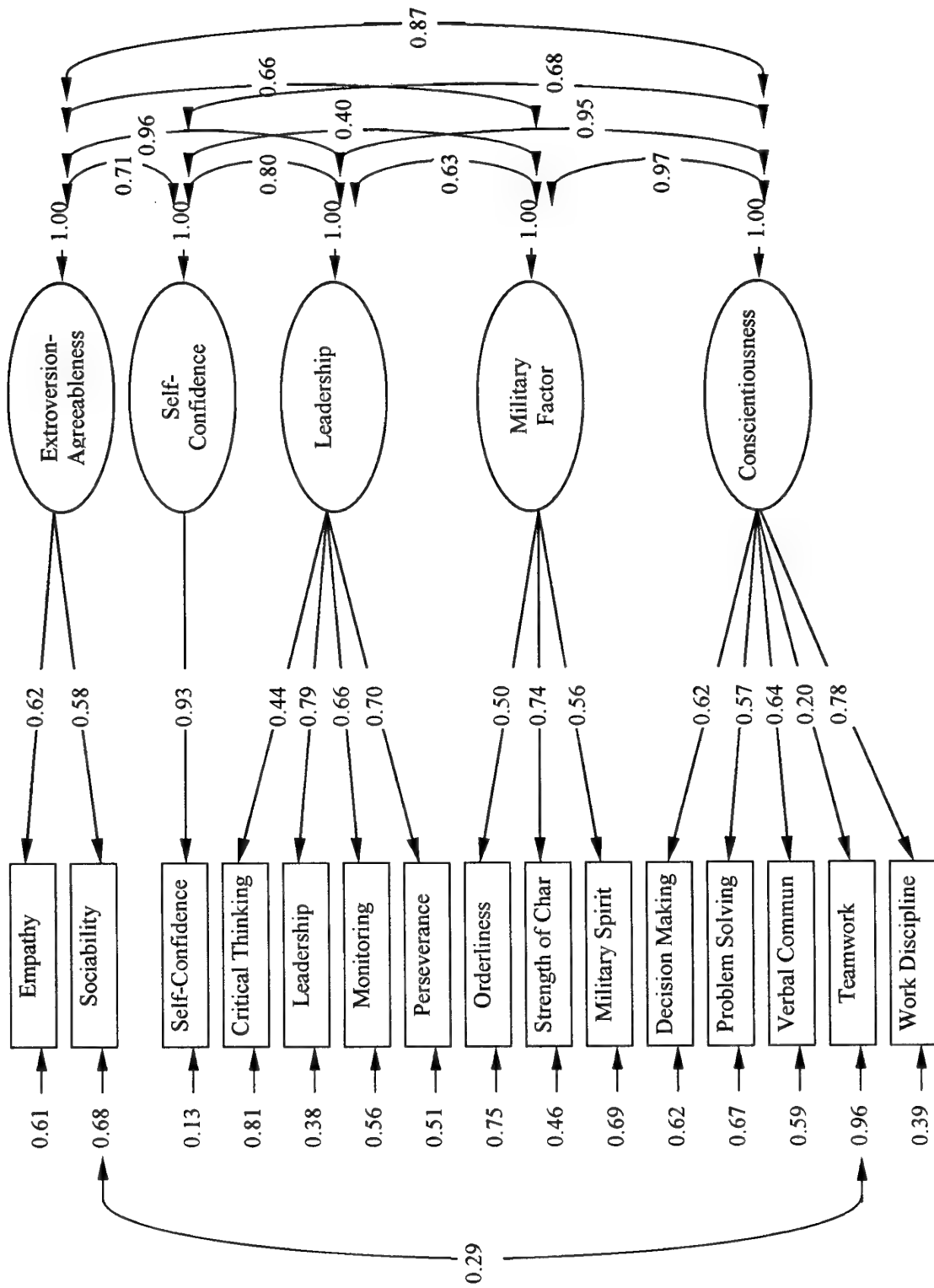
Note. Internal consistency reliabilities ( $\alpha$ ) are presented in the diagonals. Ratings are done on a 6-point Likert scale; increase in the means indicating higher scores in the positive direction on a given subdimension. Correlations higher than .09 are significant at alpha level .05. Correlations higher than .12 are significant at alpha level .01.  
<sup>1</sup>  $N = 519$ .

Table 3  
Sample Items for Subdimensions

Dimension	Subdimension	Number of items	Sample Item
Conscientiousness/ Self-Discipline	Work discipline	24	When I am assigned a task, I immediately start working on it.
	Problem-solving	3	I prefer playing chess to playing backgammon.
	Decision-making	3	I feel comfortable when someone decides for me. <b>R</b>
	Verbal communication	3	I have quite a rich vocabulary.
	Teamwork	8	I prefer working independent to working with others. <b>R</b>
M-Factor	Military spirit	10	I believe that the rules have been made to facilitate work.
	Strength of character	9	I can break a promise to save face. <b>R</b>
	Orderliness	7	I am not bothered by a messy desk if I am able to find what I need. <b>R</b>
Self-Confidence	Self-confidence	6	I feel pride in my skills
	Risk-taking	2	I will not invest on anything if I cannot foresee the consequences. <b>R</b>
	Courage	3	I like to try new things even if they can be dangerous.
Agreeableness- Extroversion	Empathy	4	I easily understand the needs and the priorities of others.
	Agreeableness	3	I avoid conflicting with others.
	Sociability	12	I dislike being alone.
Leadership	Critical thinking	3	I never question things that are given. <b>R</b>
	Leadership	16	I can make people with opposing views accept my ideas.
	Monitoring task progress	9	I try to monitor task progress when working with a group.
	Perseverance	8	I can step back when faced with obstacles. <b>R</b>
Total number of items		133	

Note. Reverse items are indicated by **R**.

Figure 1  
Modified Measurement Model: Confirmatory Factor Analysis



## Predictions from Physical Fitness Tests Impact of Age and Gender

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### Summary

Physical fitness tests are employed in most armed forces; the purpose being to avoid persons with insufficient fitness. The predictive value is strongly influenced by the prevalence of the tested quality. In regard to physical work capacity, higher values are more prevalent among males compared to females and among younger people compared to older ones. At a prevalence of .9 for males and .4 for females, the success rate among those who passes the test would theoretically be 95% and 70%, respectively. Prevalence should be included when predicting the possible outcome of different tests. This theoretical example is in line with empirical findings. For example, among fire-fighters who had passed a treadmill test, the success rate in a smoke-diving task was 90% in age group 20-30 years, 78% in age group 31-40 years, 69% in age group 41-50 years, and 30% in age group 51-60 years.

### Introduction

Most jobs in the armed forces are including physical work. Therefore, tests of physical fitness are employed; the purpose being to avoid persons with insufficient fitness. Different principals are used when setting the pass/fail level. One is to have the same requirement irrespective of age and gender, another is to adjust the demands to those factors.

Ideally, the test should make all those having a sufficient capacity pass, while the others should fail. Such test are, however, practically non-existent, meaning that some with an insufficient capacity will pass, while some of those having a sufficient capacity will fail. This lack of perfection will induce errors, some of which may become quite costly.

An often forgotten problem in this context is that the task success rate among those passing a test varies with the true capacity of the population from which the group is recruited. A high prevalence of people having a sufficient capacity will give a higher success rate, among those who pass the test, than if the group is coming from a population with a lower capacity.

A high level of physical performance is more prevalent among men compared to women and among young adults compared to middle-aged ones.

Test reliability is considered very important. Some of its implications are, however, not frequently recognized.

The purpose of this paper is to elucidate some fundamental, but often forgotten theoretical principals and their impact on the selection process especially in regard to age and gender.

### Test scores and task performance

Relating test scores to task, or job, performance very often display far from perfect relationships. This is illustrated in figure 1. Including minimum requirements for the job and pass level for the test will divide the population into four categories:

- True positive; passing the test - sufficient capacity
- True negative; failing the test - insufficient capacity
- False positive; passing the test - insufficient capacity
- False negative; failing the test - sufficient capacity

The first two outcomes are correct, while the latter two are erroneous. These errors differ from one another regarding the consequences they produce. The false positive results will lead to an acceptance of people with insufficient capacity, who eventually may leave the organization and that represents a cost giving little or no benefit. The false negative results give rise to rejections of qualified people. In turn it may lead to problems in finding enough people with sufficient quality.

Increasing the pass level will reduce the problem associated with recruiting people with insufficient capacity, but it will increase the problem with

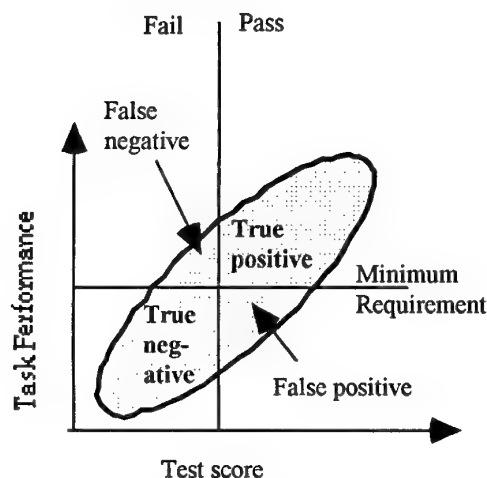


Figure 1. The figure illustrates a theoretical relationship between test scores and task performance.

rejecting people with sufficient qualities (see figure 1). So, with a given test, it is not possible to reduce both of these errors. It is a question of analyzing the effects of the errors as to minimize their negative consequences.

So far, the qualitative aspects have been discussed. In order to better understand the practical importance, it is necessary to look at some of the quantitative aspects.

#### Prediction, Sensitivity, Specificity and Prevalence

First, we should define those terms. The **positive predictive value** is the fraction of truly qualified among those who passes the test.

**Sensitivity** is the probability that the test will identify a given quality. If the sensitivity is unity, the test will find all with that quality; a value of .5 means that only half of the people having that quality will be identified by the test. **Specificity** is the probability that the test will identify people who are lacking this quality. A specificity of 1.0 means that the test is expected correctly identify all of those who are lacking that quality, and that nobody who is lacking the quality would be judged as having it. **Prevalence** is the fraction of a population having a certain quality.

The numeric relationship between these components is:

$$PPV = \frac{Pr \cdot Sens}{Pr \cdot Sens + (1-Pr) \cdot (1-Spec)}$$

(eq. 1)

where

PPV = Positive predictive value,

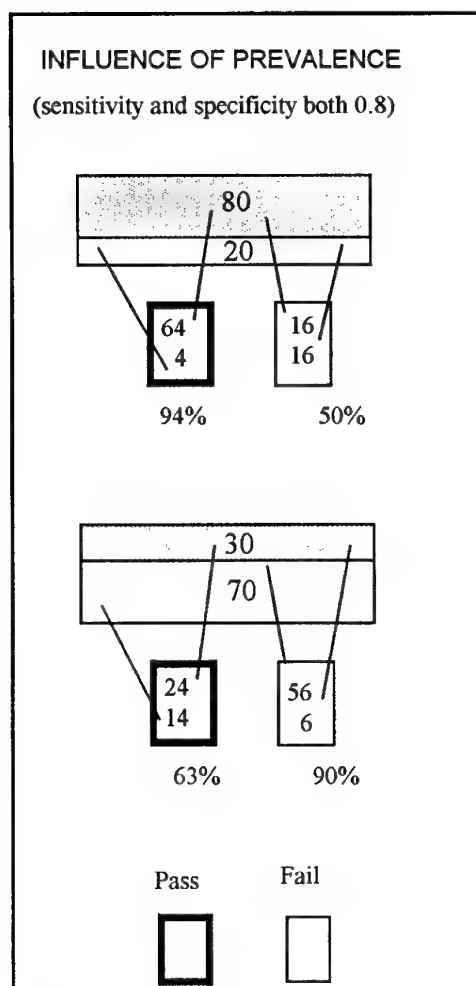
Pr = Prevalence,

Sens = sensitivity,

and Spec = Specificity.

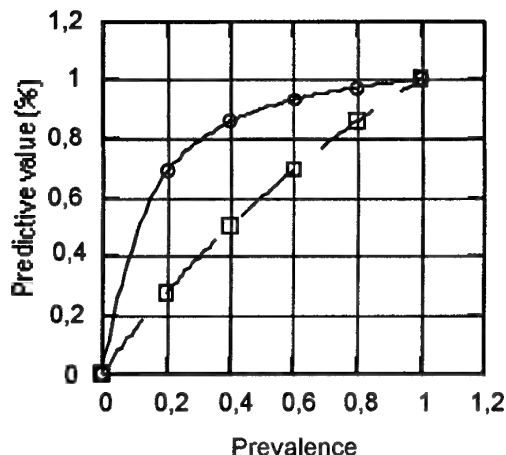
So, increasing Pr, Sens or Spec work in the direction of increasing PPV. In other words, given the values for sensitivity and specificity, the fraction of truly qualified among those passing the test increases if this certain quality becomes more prevalent in the population. Hence, one would expect that among those passing a strength test, more men than women, and more 30 year old than 60 year old ones, would be able manage jobs that include the lifting of heavy objects. The order of magnitude of this effect is primarily influenced by the specificity of the test. This is because decreasing specificity leads to an increasing denominator of equation 1, while changing the sensitivity affects both the numerator and denominator.

Knowing the numeric value of these factors, it is possible to calculate and predict the outcome of various test procedures. An example is given in figure 2, which is displaying the outcome of test performed on different populations which differs in regard to the prevalence. Assuming Sens = Spec = .8, the PPV is .63 for Pr = 30%, and .94 for Pr = 80%.



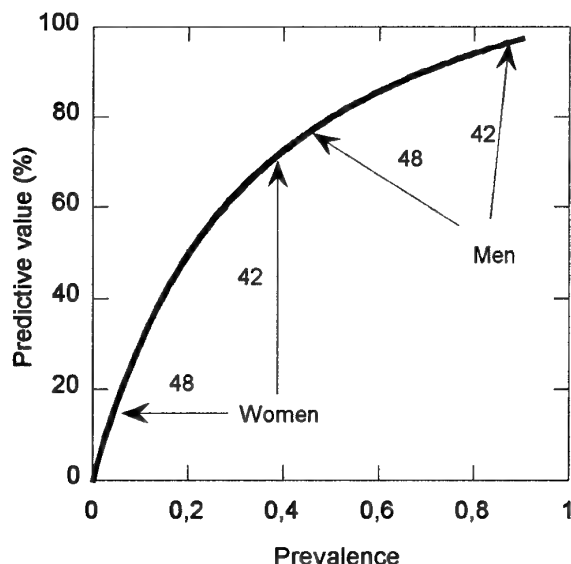
**Figure 2.** Influence of prevalence on the predictive value of a given test. Numbers expressed as per cent denote the fraction of correct predictions among those who pass as well as among those who fail.

Another example is given in figure 3, displaying the effect of prevalence for tests with different sensitivity and specificity. It is evident that the effect of prevalence is greater for poor test than for good ones.



**Figure 3.** This figure demonstrates how the predictive value is influenced by the prevalence and the quality of the test. It is assumed that the better of these tests is characterised by sensitivity = specificity = .9 while the poor test had sensitivity = specificity = .6

These effects can be quite dramatic as illustrated in figure 4. Among men the PPV was 95% and among women 70%, i.e., among those who passed the test 95% of the men is expected to have a sufficient capacity compared to 70% of the women.



**Figure 4.** This figure demonstrates that prevalence strongly influences the predictive value. Also, the prevalence of different levels (42 and 48 ml·kg<sup>-1</sup>·min<sup>-1</sup>) of maximal oxygen uptake among men and women of age 20 to 25 years is indicated.

The assumption that if you pass the test your physical fitness is adequate is not always correct, and

moreover the magnitude this lack of correctness varies with the prevalence.

Another consequence of this is that in order to correctly identify people with characteristics that are less prevalent, one needs test with very high sensitivity and even more important a very high specificity.

The PPV describes only one type of error; the order of magnitude of which is affected primarily by the specificity of the test and the prevalence.

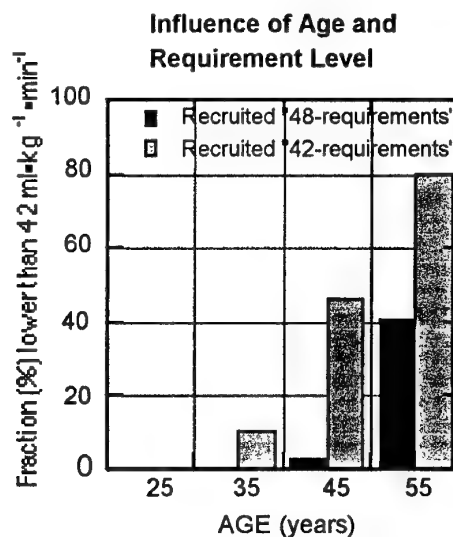
The sensitivity is of course important because tests with low sensitivity will fail to identify a lot of people with sufficient capacity (see figure 1).

#### Age

Physical performance decreases with age among adults. Hence, the number of people able to manage a given physical task is lower among the 40 year old than in the 25 year old. The same effect is, thus, expected among different age groups.

Another interesting question is the order of magnitude, i.e., what fraction of different age groups are able to achieve given levels of performance. An example, is presented in figure 5. The calculation is based on the results from 371 officers running 2000 m and a reduction in maximal oxygen uptake by 8% per 10 years (Shwartz & Reibold, 1990).

The effect is quite dramatic; the fraction increased from 0 % at age 25 to 40% at age 40. Thus, almost half of the population will display an inadequate capacity.



**Figure 5.** Influence of age and recruitment requirement level on the fraction that will not be able to pass a given test.

This may cause unwanted consequence for the individual as well as for the organization. One way to



reduce these problems is to increase the requirements at the age of 25, leaving enough room for age-related reductions of physical performance. The side effect is, however, that more people will be excluded, some of which having qualities of importance for the job. Moreover, it will become much more difficult to recruit women. For example, increasing the entrance requirements to a level that would reduce the fraction of men that fails to 5 % at age 55, would exclude 95-98% of the women.

#### Success rate and test scores.

In general, the correlation between test score and actual job performance is fairly low. Thus, test score variance usually explain less than 25 percent of the variation in performance, which is not too impressive. One might even ask if testing is useful.

This leads to the need of defining the term useful. First, the tests have to produce better predictions than using pure chance, e.g., a lottery. Second, the cost for testing must be less than the costs of the problems resulting from an inadequate selection.

However, providing that the test produces a result better than pure chance, test with moderate quality may be useful. For example, the correlation between running performance and field exercises is seldom very high (see figure 8) Still the fraction failing to manage such exercises is usually lower among subjects with high running performance than among those showing low values (figure 9). However, the cost of such testing must still be weighed against its benefit.

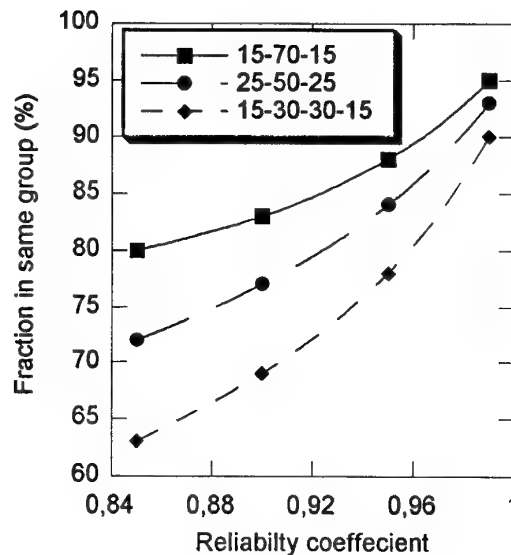
Information about different success rates can be treated statistically (Lubinski & Humphreys, 1996).

#### Reliability and classification

Another aspect is test reliability, i.e., capability of a test to reproduce the results. For example, measuring a person's body mass twice should give very much the same result. During selection procedures, the test results are often used for the purpose of dividing the population into different groups, e.g. "low", "average", "high". Ideally, two consecutive tests should place the subject in the same group at both trials. In reality, such an outcome is very rare. Most tests perform less well. There are mainly two factors that influence the performance of a test in that respect (figure 6)

- number of groups; more groups will result in less subjects getting the same classification at both trials.
- reliability coefficient; higher value gives more subjects getting the same classification at first and second trials.

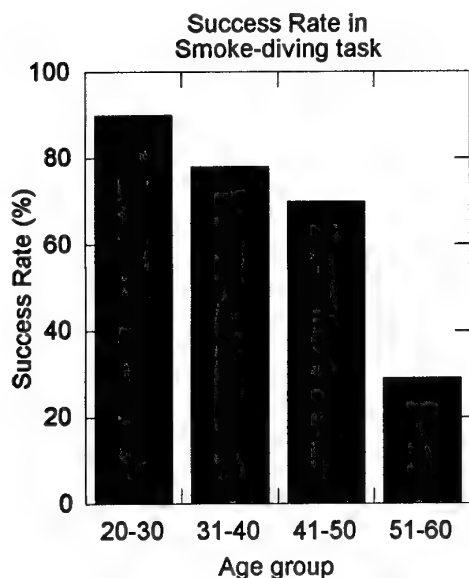
A practical implication is that the number of groups has to be adjusted to the actual level of test reliability; otherwise the classification will result too much from chance and too little from true value.



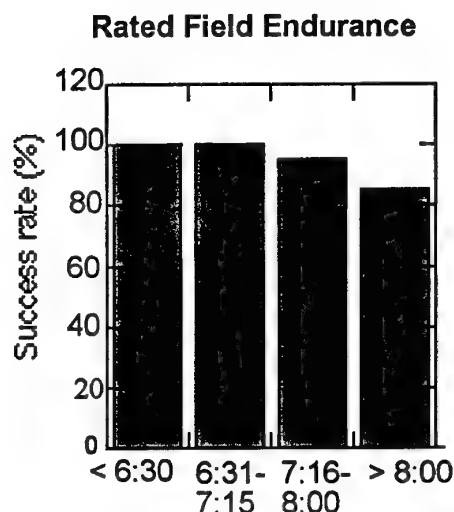
**Figure 6.** This figure illustrates the effect of test reliability on fraction of the tested population that will get the same classification when test twice. The influence of different classifications are also shown. The figures 15-70-15 denote the fraction of the population in each group. (Data adopted from A. Avén, 1996)

#### Practical results and implications

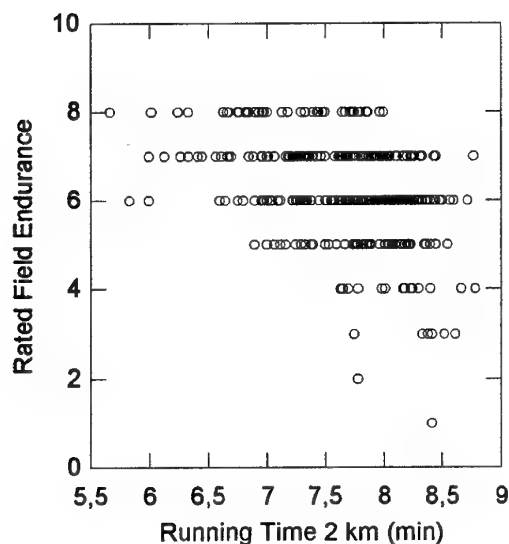
This can be illustrated by a study on firefighters of different age, who performed a walking test on a treadmill (Danielsson & Bergh, 1997). Those who passed also performed a smoke-diving test. The success rate in that test was higher among the younger age groups compared with the older ones (figure 7). This is an illustration of the principals described earlier, i.e., that among people that have passed a test, the success rate in job-related tasks is lower in populations with a lower capacity (lower prevalence of people with high capacity). A practical significance of this is that tests may produce erroneous information about the chances of managing the job.



**Figure 7.** Success Rate in a smoke-diving task among firefighters that have passed the compulsory treadmill test. (Data from Danielsson & Bergh 1997)



**Figure 9.** The fraction rated as having adequate field endurance among groups with different running performance. Note that even if the correlation shown in the previous figure is rather low there is a difference in rated field endurance between groups.



**Figure 8.** Rated Field Endurance in relation to running time for 2 km. Adequate endurance corresponds to a rating score of 5.

#### References

- Avén A. Isokaiprovets reliabilitet (The reliability of the Isokai test) PM 47:54, 1996.
- Danielsson U. and Bergh U. Fysiska krav på befattningar inom räddningstjänsten (Physical work demands in the Rescue Service). FOA-R-97--00549-720--SE, ISSN 1104-9154, 1997.
- Lubinski D. and Humphreys L. G. Seeing the forest from the trees. Psychology, Public Policy, and Law Enforcement, vol. 2, No 2, 363-376, 1996
- Shvartz E. and R. C. Reibold. Aerobic fitness norms for males and females aged 6-75 years: a review. Aviat. Space Environ. Med. 61: 3-11, 1990.

## Personality Hardiness as a Predictor of Officer Cadet Leadership Performance<sup>1</sup>

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**Summary:** Future military officers must be highly resilient, resourceful, and quick to adjust in rapidly changing situations. In view of this, the time may be now to reconsider the role of normal personality traits that might influence leader performance. A promising personality dimension in this regard is known as "hardiness". High hardy persons have a strong sense of life and work commitment, a greater belief of control, and more openness to change and challenges in life. The present study examined one class of United States Military Academy cadets over time, testing the power of hardiness and several additional cognitive and personality variables to predict military leadership performance over a four-year period. In regression models predicting Military Development (MD) grades for each of four college years, as well as cumulative MD grades over four years, hardiness proved a strong and consistent predictor of military development grades for these officer cadets. It appears that hardiness -- this pervasive and steady sense of commitment, control, and challenge -- facilitates adaptation and performance in the highly stressful world of West Point Army officer cadets. Evidence from this study suggests that personality hardiness is advantageous for young and future U.S. Army officers. These findings have implications for officer selection and training.

**Introduction:** In the selection and training of military officers, little attention has been paid to normal personality characteristics. In part this is due to a common confounding of personality with psychopathology. When measures of psychopathology (for example, the Minnesota Multiphasic Personality Inventory, MMPI) have shown little predictive utility beyond initial screening, many investigators have wrongly concluded that personality is not a good predictor of performance in military personnel. But there is an important set of "normal" personality characteristics that goes beyond psychopathology: common traits or tendencies on which people differ, but which have nothing directly

to do with sickness or maladaptation. The familiar dimensions of extraversion, openness, and conscientiousness provide examples. People can be high or low on these dimensions, without being pathological or maladapted in any way.

Considering some of the special demands and adaptational challenges that future military officers and leaders will likely face, it is time to seriously reconsider the role of normal personality traits that might influence leader performance. If personality characteristics can be identified that confer adaptational and performance advantages for military leaders, this knowledge could be very useful in building more effective selection and training programs. One characteristic of particular promise in this regard is personality "hardiness". Conceptually, hardiness is a personality dimension that develops early in life and is reasonably stable over time, though amenable to change and probably trainable under certain conditions (Kobasa, 1979; Maddi & Kobasa, 1984). Hardy persons have a high sense of life and work commitment, a greater feeling of control, and are more open to change and challenges in life. They tend to interpret stressful and painful experiences as a normal aspect of existence, part of life that is overall interesting and worthwhile. Research studies with a variety of occupational groups have found this dimension of hardiness appears to function as a significant moderator or buffer of stress (e.g., Bartone, 1989; Contrada, 1989; Kobasa, Maddi & Kahn, 1982; Roth et. al, 1989; Wiebe, 1991). In military groups, hardiness has also been identified as a significant moderator of combat exposure stress in U.S. Gulf War soldiers (Bartone, 1993; 1999).

Selecting good future leaders, and then developing them are important tasks for military organizations. The present study examines one class of United States Military Academy cadets over time, testing the power of several cognitive and personality variables

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to predict military leadership performance across four years of training experience.

**Method:** A single class of U.S. Military Academy - West Point students (N=1143) was studied over time, from arrival in spring of 1994 until graduation four years later. Extensive measures were collected on this cohort, including personal background and biographical data, cognitive abilities and problem solving, personality, values, and leadership style (Tremble, 1997; Evans, 1997). Also, at the end of each semester and summer training period a number of leadership performance indicators were extracted from the Academy archival files and added to the database. To assess personality hardness, a short (15-item) scale was administered in the spring of 1998. Of approximately 864 administered, 435 completed surveys were returned for an excellent response rate of slightly better than 50%.

**Instruments:** Of several leadership indicators available on cadets, the most important and comprehensive is the "Military Development Grade" (MD). This is a performance score or grade assigned to cadets at the end of each semester and summer training period, and is a weighted average of performance ratings by 2-3 key supervisors (U.S. Corps of Cadets, 1995). Fifty percent of the MD grade is given by the Tactical Officer in charge of the cadet, with the remaining 50% coming from cadet supervisors. Thus, the MD grade represents a weighted average of several supervisors' ratings on military performance and leadership. For the present study, an average Military Development score was computed for each of the four college years, and a final one representing grades across all four years (MD grades for summer training cycles were treated separately for various reasons). Military Development grades assigned during the academic semesters reflect leadership and military performance over a substantial period of time, within the daily school and training "garrison" environment. As cadets progress up the class structure from freshman to seniors, they are given increased leadership responsibilities and opportunities. Thus, Military Development grades are more related to actual leadership performance for the upper classes, compared to the lower classes where appearance and performance of military tasks are more germane. (For more on the nature of Military Development grades at West Point, see Celebioglu, 1999).

**Cognitive measures** that were included as predictors:

1. Mental Rotation Test. Respondents must correctly identify geometric figures when rotated, as viewed on

a printed page (20 items; Mumford et al., 1993). High scores reflect good spatial abilities.

2. Logical Reasoning Test. Respondents read a series of mutually dependent statements, and then answer True or False to a set of statements that might logically follow (30 items, after Mumford et al., 1993). High scores reflect good logical reasoning skills.

3. Social Judgement. This measure is based on the Mumford et al (1993) executive leadership model that defines leadership as "discretionary social problem solving in ill-defined domains". Respondents are presented with two "organizational scenarios", and asked to answer 3 open-ended questions about it (see Appendix A). Answers are scored on a 1 (Not at All) to 6 (To a very large extent) scale for: **self-objectivity** (knowing one's strengths and weaknesses and able to work with or around them); **self-reflectivity** (introspective, intuitive, good understanding of self based on past experience; learns from experience and past mistakes); **sensitivity to fit** (knows what will work and what won't in a given situation, driven more by affect than knowledge); **systems perception** (good understanding of others in social systems, sensitive to social needs, goals, demands at multiple levels in social systems); **good judgement under uncertain conditions** (ability to make good decisions under ambiguous conditions, and take appropriate action); **systems commitment** (recognition of one's and others' roles in broader social systems, pursues socially constructive goals); and **overall wisdom** (overall how wise is the response to this scenario?). Scores on these 7 dimensions are averaged for a total Social Judgement score.

4. Problem Solving. Also based on the model by Mumford et al (1993), but elaborated by Tremble et. al. (1997), respondents answer 3 open ended questions about each of two military scenarios. Answers are scored on a 1 (low) to 5 (high) scale for the following 8 dimensions: **short vs long-term implications; attention to restrictions; nature of goals-self; nature of goals-organization; quality; objectivity; number of alternatives; and originality.** Scores on these 8 dimensions are averaged for a total Problem Solving score. All cognitive measures were administered in the summer of the freshman year (1994). Some additional background information on the Problem Solving measure is available in Dela Rosa et. al., 1997.

5. College Entrance Equivalency Rating (CEER), represents SAT or ACT college entrance examination scores, on a standardized scale.

**Personality measures** that were included as predictors:

1. Hardiness. Conceptually, hardiness is a personality variable that develops early in life and is reasonably stable over time, though amenable to change under certain conditions (Kobasa, 1979; Maddi & Kobasa, 1984). Hardy persons have a high sense of life and work commitment, a greater feeling of control, and are more open to change and challenges in life. They tend to interpret stressful and painful experiences as a normal aspect of existence, part of life that is overall interesting and worthwhile. Research studies with a variety of occupational groups have found this dimension of hardiness appears to function as a significant moderator or buffer of stress (e.g., Bartone, 1989; Contrada, 1989; Kobasa, Maddi & Kahn, 1982; Roth et. al, 1989; Wiebe, 1991). In military groups, hardiness has also been identified as a significant moderator of combat exposure stress in US Gulf War soldiers (Bartone, 1993). To measure hardiness, this study used a 15-item scale that improves over earlier instruments, including both positively and negatively keyed items, and covering the three important hardiness facets of commitment, control and challenge (Bartone et al, 1989; Bartone, 1995). Cronbach's alpha coefficient for the total measure is .70 in the present sample. In a sample of 105 (West Point) college students, the three-week test-retest reliability coefficient is .78. The short hardiness scale was administered to this cohort during spring of their senior year (Bartone, 1998), with a response rate of 50% (N=435).

2. **Assessment of Background and Life Experiences (ABLE)**. Developed by the Army Research Institute, the short form yields scores on six scales: **Dominance, Energy Level, Work Orientation, Emotional Stability, Traditional Values, and Social Desirability** (Mael & Schwartz, 1991). Using existing data from admissions surveys, Evans (1997) created empirically-based analog measures for these six ABLE scales. It is these analog ABLE scales that were used in the present study.

3. **NEO-PI**. Using the same empirical procedures, Evans (1997) created analog scores corresponding to the so-called "Big Five" personality dimensions as measured by the NEO Personality Instrument (Costa & McCrae, 1985). The analog instrument yields scores on the following scales: **Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness**. The survey responses used to

generate the ABLE and NEO scores were collected shortly after entry to West Point in June 1994.

All 17 predictor variables were entered into regression models predicting in turn freshman, sophomore, junior and senior Military Development grades, and total MD grade averaged across all academic semesters. The regression method applied is "backward elimination", a stepwise procedure that eliminates the weakest variables in turn and recomputes the regression equation after each elimination. This iterative procedure continues until only statistically significant predictor variables remain in the model.

**Results:** Multiple regression procedures revealed several models that successfully predict Military Development (MD) grades for each of four college years, as well as total cumulative averages on Military Development. A model predicting cumulative MD across four years (Multiple R = .25,  $F(7, 1135) = 11.08$ ,  $p < .001$ ) includes as significant predictors the mental abilities indicator of College Entrance Examination scores, and the personality dimensions Hardiness, Traditional Values, Dominance, Emotional Stability(-), and Work Orientation. These regression results are summarized in Table 1.

**TABLE 1**  
Leadership (MD) predictors, West Point, 4 Years Total

Predictor	Beta	T	p <
College Entrance Exam	.12	4.1	.000
Hardiness	.10	3.4	.01
Social Judgement	.09	3.1	.01
Traditional Values	.09	2.6	.01
Dominance	.08	2.6	.01
Emotional Stability	-.07	-2.1	.03
Work Orientation	.07	2.0	.05

Multiple Regression with backward elimination,  
mean substitution for missing data

Model:  $F(7, 1135) = 11.08$ ,  $p < .0001$

Multiple R = .25

R Square = .06

An additional significant predictor is Social Judgement, which appears to lie somewhere between cognition and personality. Regression models predicting military leadership performance separately for the four academic years show a similar pattern of both cognitive and personality variables as significant, with some indication that emotional intelligence (hardiness, emotional stability(-), social

judgement) and logical reasoning take on greater importance for upperclassmen.

**Discussion:** These results form a coherent picture of factors influencing leader development over time, and lend support to an integrated model of cognitive, emotional and personality variables influencing leader development and performance. While all the tested models leave considerable variance unaccounted for in officer cadet military performance, the personality variables consistently show a level of explanatory power that equals or exceeds that of traditional cognitive variables. Further, personality hardiness emerges as the strongest and most consistent predictor of military development grades for these officer cadets. It appears that hardiness -- a characteristic sense of commitment, control, and challenge -- facilitates adaptation and performance in the rather stressful world of West Point Army officer cadets. Evidence from this study thus confirms that personality hardiness is advantageous for future Army officers.

A somewhat surprising finding is that emotional stability emerges as a *negative* predictor of leadership grades for seniors, and with respect to grades averaged over all four years. To understand this, it must first be recognized that we are dealing with an unusually health group, already screened before entry for physical, academic, and social health and fitness. All successful candidates are thus already reasonably well-adjusted in psychological terms. Among this well-adjusted group, those who score low on "emotional stability" may be those who are more self-aware and reflective, as well as honest and self-assured enough to admit they sometimes felt depressed or overwhelmed during the past year (items on the emotional intelligence scale). This interpretation also fits well with the hardiness theoretical background, which is rooted in existential psychology (Maddi, 1967; Keen, 1970) idea of the "authentic person", who accepts life in all its dimensions, pain and disappointments as well as happiness. From this perspective, the hardy, authentic person will be one who is more open and self-aware, as well as more aware of the social world. These are key features of what has recently been described as "emotional intelligence" (Goleman, 1995; Salovey & Mayer, 1990).

Additional work is needed to evaluate the potential value of hardiness for commissioned Army officers functioning as leaders in actual military operations. Should hardiness prove valuable there as well, results can be applied to help shape and improve leader development programs across organizational levels. Future work in this area should

also seek to expand the predictive model to include additional predictors, such as personal background as well as situational and contextual variables that might influence leader development directly, or in interaction with other variables such as hardiness. In this regard, an interesting issue would be to explore the possible link of hardiness to recognized leadership styles or traits, such as charismatic or transformational leadership (Bass, 1998; Burns, 1978; House & Howell, 1992).

A beginning attempt was recently made to explore this question within the officer cadet data set reported on here. Results show that transformational leadership, as rated by cadet subordinates at West Point, enters a regression model as an independent significant predictor of total Military Development Grades (across all four years), after personality hardiness, and followed by College Entrance Exam Scores, Social Judgement, Emotional Stability (-), Extraversion, and Traditional Values. With the inclusion of Transformational Leadership, the strength of the overall model is slightly improved. A correlational analysis reveals that transformational leadership is not significantly correlated with hardiness in this sample, although transformational leadership is moderately correlated with the hardiness facet of *commitment*. These are provocative findings that call for follow-up work. It is possible that those with the personality characteristic of hardiness are more apt to develop a transformational leadership style, but that this will occur only under appropriate environmental or organizational conditions.

Another refinement for future work would be to use a more comprehensive criterion indicator of leadership performance, one that incorporates subordinate ratings as well as peer and supervisor for a "360°" picture. And while studies such as this predicting leadership performance in the training and development environment are important, it is equally important to identify what factors are predictive of successful leadership performance beyond the training environment, as officers and leaders in the increasingly complex and demanding world of modern military operations.

## References:

- Bartone, P.T. (1999). Hardiness protects against war-related stress in Army reserve forces. *Consulting Psychology Journal*, 51, 72-82.
- Bartone, P.T. (1998). Test-retest reliability of a short hardiness scale. Unpub. manuscript, Department of Behavioral Sciences and Leadership, U.S. Military Academy, West Point, New York.

- Bartone, P.T. (1989). Predictors of stress-related illness in city bus drivers. J. of Occupational Medicine, 31, 657-663.
- Bartone, P.T. (June, 1993). Psychosocial predictors of soldier adjustment to combat stress. Paper presented at the Third European Conference on Traumatic Stress, Bergen, Norway.
- Bartone, P.T. (July, 1995). A short hardiness scale. Paper presented at the Annual Convention of the American Psychological Society, New York.
- Bartone, P.T. & Snook, S.A. (May, 1999). Cognitive and personality factors predict leader development in U.S. Army cadets. Paper presented at the 35<sup>th</sup> International Applied Military Psychology Symposium (IAMPS), Florence, Italy.
- Bartone, P.T., Ursano, R.J., Wright, K.W. & Ingraham, L.H. (1989). The impact of a military air disaster on the health of assistance workers: A prospective study. J. of Nervous and Mental Disease, 177, 317-328.
- Bass, B. M. (1998). Transformational Leadership. Mahwah, New Jersey: Lawrence Erlbaum.
- Burns, J.M. (1978). Leadership. New York: Harper & Row.
- Celebioglu, M. (1999). The Military Program Score: A shortcoming of the cadet leader development system. Senior research project, Department of Behavioral Sciences and Leadership, United States Military Academy, West Point, New York.
- Contrada, R.J. (1989). Type A behavior, personality hardiness, and cardiovascular responses to stress. J. of Personality and Social Psychology, 57, 895-903.
- Costa, P.T., Jr. & McCrae, R.R. (1985). The NEO Personality Inventory Manual. Odessa, FL: Psychological Assessment Resources.
- Dela Rosa, M.R., Knapp, D.J., Katz, B.D., & Payne, S.C. (1997). Scoring improvements to three leadership predictors. (ARI Technical Report 1070). Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Evans, K.L. (1997). Estimating personality constructs from archival data. (ARI Technical Report 1063). Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Goleman, D. (1995). Emotional Intelligence. New York: Bantam Books.
- House, R.J. & Howell, J.M. (1992). Personality and charismatic leadership. Leadership Quarterly, 3, 81-108.
- Keen, E. (1970). Three faces of being: Toward an existential clinical psychology. New York: Appleton-Century-Croft.
- Kobasa, S.C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. J. of Personality and Social Psychology, 37, 1-11.
- Kobasa, S.C. & Maddi, S.R. (1977). Existential personality theory. In R. Corsini (Ed.), Existential Personality Theories. Itasca, IL: Peacock.
- Kobasa, S.C., Maddi, S.R., & Kahn, S. (1982) Hardiness and health: A prospective study. J. of Personality & Social Psychology, 42, 168-177.
- Maddi, S.R. (1967). The existential neurosis. J. of Abnormal Psychology, 72, 311-325.
- Maddi, S.R. & Kobasa, S.C. (1984). The Hardy Executive. Homewood, IL: Dow Jones-Irwin.
- Mael, F.A. & Schwartz, A.C. (1991). Capturing temperament constructs with objective biodata. (ARI Technical Report 939). Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences (AD A245 119).
- Mumford, M.D., Zaccaro, S.J., Harding, F.D., Fleishman, E.A. & Reiter-Palmon, R. (1993). Cognitive & temperament predictors of executive ability: Principles for developing leadership capacity (ARI Technical Report 977). Alexandria, VA: U.S. Army Research Institute for the Behavioral & Social Sciences (AD A267 589).
- Roth, D.L., Wiebe, D.J., Fillingim, R.B. & Shay, K.A. (1989). Life events, fitness, hardiness, and health: A simultaneous analysis of proposed stress-resistance effects. J. of Personality and Social Psychology, 57, 136-142.
- Salovey, P. & Mayer, J.D. (1990). Emotional intelligence. Imagination, Cognition and Personality, 9, 185-211.
- Tremble, T.R. (1997). Longitudinal research on leadership development: Plans and status. Unpublished manuscript, Department of Behavioral Sciences & Leadership, U.S. Military Academy, West Point, New York.
- Tremble, T.R., Kane, T.D. & Stewart, S.R. (1997). A note on organizational leadership as problem solving (ARI Research Note 97-03). Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences.
- U.S. Corps of Cadets (1995). Leadership evaluation and developmental ratings. (USCC Regulation 623-1). West Point, New York: United States Military Academy.
- Wiebe, D.J. (1991). Hardiness and stress moderation: A test of proposed mechanisms. J. of Personality and Social Psychology, 60, 89-99.



## A Person-Oriented Job Analysis for Identifying Skills and Personality Attributes to be Assessed in Officer Selection

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### Summary

The purpose of the present research was to identify personality constructs to be assessed in the selection of officers in the Turkish Armed Forces using a personality-oriented job analysis approach. Personality-oriented job analytic interviews were conducted both with currently employed and former officers ( $N = 78$ ). Content-analysis of the interviews led to the identification of a list of attributes presumed to be relevant. The attributes were then rated by a group of officers ( $N = 447$ ) for relevance and importance. Principal component analysis of the weighted relevance ratings resulted in five personality dimensions as being relevant for the job of an officer: Conscientiousness/Self-Discipline, Military Factor, Self-Confidence, Agreeableness-Extraversion, and Leadership.

### Introduction

Job analysis is believed to be the most central of all human resources management activities (e.g., Ghorpade, 1988). The goal of most job analytic techniques is to identify the tasks performed by the job incumbents, the qualities required on the job as well as the physical, technological and social conditions under which the job gets done. Traditionally, job analytic techniques are divided into two broad categories: job-oriented and person-oriented techniques. Job oriented techniques, sometimes referred to as task analyses, basically focus on the activities conducted by the job incumbents. Person-oriented techniques, on the other hand, focus on the knowledge, skills, abilities and other attributes needed to perform the job.

Most person-oriented job analytic techniques, such as the Position Analysis Questionnaire (McCormick, Jeanneret, & Mecham, 1972), analyze jobs in terms of the human attributes, basically, skills and abilities, needed on the job. However, personality characteristics, or attributes other than task related knowledge and abilities, have in general received much less attention in the person-oriented techniques. One recent exception to this general trend is the Personality-Related Position Requirements Form (PPRF) developed by Raymark, Schmit, and Guion (1997). Raymark and colleagues argue that selection strategies usually evolve from an understanding of jobs based on job analytic information. However, most common job analysis inventories focus on cognitive or psychomotor aspects of jobs, and hence lead to an overemphasis on cognitive and/or psychomotor predictors in selection. The PPRF consists of 112 items on 12 position requirements or subdimensions (e.g., general leadership, friendly disposition, general trustworthiness, emotional stability, and desire to generate ideas) framed by the Big-Five personality constructs. Empirical evidence, although limited at the moment, suggests that the 12 position requirements are useful in differentiating among jobs.

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Recent literature suggests that personality predicts job performance, and that validities of certain personality constructs, such as conscientiousness or integrity, generalize across situations (e.g., Barrick & Big-Five dimensions and job performance relationship indicated that Extraversion was a valid predictor of job performance for managerial and sales jobs and that Conscientiousness was a valid predictor of job performance for all occupations. In a meta-analysis of research on the Big-Five personality dimensions and job performance in the European Community, Salgado reported that conscientiousness and Emotional Stability were valid predictors of job performance across occupational groups. Furthermore, extraversion was a valid predictor for managers and police, whereas openness to experience and agreeableness made significant contributions to training performance in general.

Despite the mounting evidence concerning the potential of personality variables in predicting job performance, personality variables have in general been overlooked in personnel selection practices. One possible reason for this seems to be the commonly used job analytic procedures that do not encourage the consideration of personality variables. What most job analysis techniques target is to identify the criteria for effective "task performance." However, as emphasized in Borman, Hanson, and Hedge's (1997) review of personnel selection literature and Arvey and Murphy's (1998) review on performance evaluation literature, performance domain is expanding and task performance by itself seems to be deficient in representing the domain of job performance. Borman and Motowidlo (1993) made a distinction between task and contextual performance. Task performance refers to the proficiency with which activities that are prescribed and formally recognized for a job are performed. Contextual performance, on the other hand, refers to interpersonal and voluntary behaviors that contribute to the enhancement of social and motivational context in which the work gets done. Contextual performance comprises discretionary behaviors such as organizational citizenship, volunteer and cooperative behaviors, and helpful acts.

Empirical evidence suggests that different facets of performance have different predictors. Murphy and Shirella (1997) emphasize the need for a multivariate framework in evaluating the validity of

Mount, 1991; Borman, Hanson, & Hedge, 1997; Hogan, Hogan, & Roberts, 1996; Hough, et al., 1990; Ones, Viswesvaran, & Schmidt, 1993; Salgado, 1997). Barrick and colleagues' meta-analysis on the selection tests. Performance is multi-faceted in nature rather than being a unitary phenomenon, and multiple predictors are relevant for predicting job performance. Specifically, attributes that lead incumbents to do well in task performance are different from those that lead incumbents to do well in contextual aspects of performance (e.g., McCloy, Campbell, & Cudeck, 1994; Motowidlo & Van Scotter, 1994; Van Scotter & Motowidlo, 1996). For example, Motowidlo and Van Scotter's findings indicated that both task performance and contextual performance contributed independently to overall job performance, and that personality variables were more likely to predict contextual performance than task performance. Personality attributes such as work orientation, dependability, adjustment, cooperativeness and internal control predicted the supervisory ratings of contextual performance of air force mechanics better than the ratings of task performance. Personality measures used in the Motowidlo and Van Scotter study were from a version of the Assessment of Background and Life Experiences (ABLE) which was developed as a part of Project A for the U.S. Army (Hough et al., 1990).

Borman et al. (1997) argue that in majority of the studies examining the relationship between job performance and personality variables overall, job performance ratings have been used as indices of performance which weight both technical/task and contextual performance. Thus, validities of personality measures might be even higher when contextual elements of performance can be measured separately.

A recent discussion concerns the bandwidth of personality measures used in personnel selection (Asthon, 1998; Borman et al., 1997; Hogan & Roberts, 1996; Ones & Viswesvaran, 1996). Ones and Viswesvaran advocate the use of broader and richer personality traits, such as integrity, rather than narrower and fine-grained personality traits in personnel selection. They present evidence supporting the power of broader personality variables in predicting job performance. However, there exists empirical evidence suggesting that broader personality constructs are not necessarily better.

Hogan and Roberts discuss examples of narrower personality traits predicting specific job performance better than broad traits. Similarly, Asthon reports that two narrow measures of personality, responsibility and risk taking, have higher validities than the Big-Five dimensions. Borman and colleagues present studies further supporting the predictive power of narrow band traits even when global measures of performance are used.

Hogan and Roberts (1996) argue that the nature of performance dictates the choice (and the band) of predictors used in selection and validity is always enhanced when predictors and the criteria are matched. Consistent with this argument we believe that job specific personality attributes needs to be identified and taken into consideration in the process of selection. Job specific personality attributes could be discovered through an approach such as the PPRF. However, such an inventory approach may still fall short of embracing the domain of interest for especially non-civilian jobs. Most military jobs are carried out in situations that are physically and psychologically stressful and demanding. Properties such as order, discipline, secrecy, and respect for the chain of command are much more valued in military jobs than they are in most civilian jobs. It is our contention that along with personality variables that have been shown to possess generalizable validities, military jobs are likely to call for personality attributes that are job specific and not necessarily demanded by non military jobs. Thus, the purpose of the studies presented in this paper was to use a personality-oriented job analysis approach to identify potentially useful personality constructs for personnel selection purposes in the Turkish Armed Forces (TAF). One point needs clarification at this point. The term personality is not used rigidly in this paper; some knowledge and skill-based individual differences variables were also included under the same term.

The TAF recruits officers from two main sources: military schools and outside sources. Officers recruited from outside sources are in fact professionals with at least a B.S. or B.A. degree. In the selection of these officers, personality tests are in general used to supplement data obtained from the other selection devices. The personality test in use in the TAF are adopted versions of the tests that are Western in origin, and there is a growing need for

both culture and job specific personality tests to be used in personnel selection. In two consecutive studies, personality variables to be considered in the selection of officers were identified. In the first study personality-oriented job analytic interviews were conducted with a group of currently employed officers and a small group of former officers who voluntarily left the military during their tryout period. Content analysis of these interviews led to the identification of personality variables as being relevant for the job of an officer. In the second study, a large group of officers of both kind rated the relevance and importance of each of the identified attribute for the job of a military officer. Resulting weighted relevance scores were subjected to a factor analysis with the purpose of identifying personality construct relevant for the job in question. These two studies represent the first step in the development of a personality test battery to be used in the selection of officers from outside sources in the TAF. Information obtained from these studies is currently being used as input in the development of a personality test battery.

#### Study I

Personality-oriented job analytic interviews, with both currently working and former officers who left the army at the end of their one-year tryout period, were conducted. The interviews were content analyzed. The results of the content analysis led to the identification of attributes thought to be relevant for the job of an officer.

#### Method

Participants. Sixty-two officers (52 males and 10 females), with a mean of 37.6 years of age and 134.5 months of experience, recruited from the civilian sources ( $N = 15$  for the Army, Navy, Gendarmerie, and  $N = 17$  for the Air Force), eight officers who graduated from military schools (all males) were interviewed. Moreover, interviews were conducted with eight officers who voluntarily left the army at the end of the one-year probationary period. Consequently, a total of 78 individuals participated in the first study. Except the former officers who were all at lower ranks, participants were roughly representative of the population of interest in terms of rank (ranging from lieutenant to colonel), gender, area of speciality (engineering, medicine, education, and administration), and performance. Average job satisfaction of the currently working officers

participated in this study was found to be 8.20 on a 10-point Likert scale (1 = Not satisfied at all; 10 = Very much satisfied).

**Job Analytic Interviews.** A semi-structured interview sheet, consisting of 16 open-ended questions, was developed to collect job analytic information. The sheet was initially developed by the authors and revised on the basis of the feedback received from the subject matter experts (i.e., the personnel officers from the Army, Air, and Naval Forces and the Gendarmerie). The sheet was composed of two parts. The first part included questions tapping into the routine and nonroutine responsibilities of the officers; materials, tools, equipment, and work aids used; and people worked in coordination. The second and the major part included questions dealing with attributes needed to be successful on the job, attributes that discriminate the successful from unsuccessful officers, profile of "ideal" officer, potential reasons for joining and leaving the army. The sheet used with the former officers included additional questions concerning the reasons for leaving the army.

**Demographic Information Questionnaire.** Demographic characteristics of the participants were assessed using a 14-item questionnaire. Information concerning gender, age, rank, tenure, area of specialization, and education level, current and former military personnel in the family, and parental education levels was collected using this questionnaire. In addition, participants were asked to rate their overall job satisfaction using a 10-point Likert scale (1 = Not satisfied at all; 10 = Very much satisfied).

**Procedure.** Interviews with the currently employed officers were conducted individually in the military headquarters. At the beginning of each interview, after introducing the purpose of the study and assuring confidentiality, the interviewers asked the subjects to fill out the demographic questionnaire. Following the completion of this questionnaire by the participants, interviews were conducted by two interviewers. One of the interviewers asked the questions and the other interviewer wrote the answers down on the job analysis sheet as verbatim as possible. Each interview lasted from 45 to 75 minutes.

As for the phone interviews, the appointments were arranged with eight former officers and a researcher interviewed the participants and recorded the answers on-line. An average session lasted about 30 minutes.

### Content Analysis and Results

The second part of each interview was subjected to content analysis in order to identify the qualities required of the job of an officer. Each interview was analyzed by two researchers independently. The personality attributes, which were either directly stated by the interviewees or inferred by the researchers, were written down. In cases where an attribute was stated more than once by the same participant, only one tally was made for that attribute. Disagreements between the analyzers over the attributes inferred were resolved through discussion. The former officers' stated reasons for leaving the TAF were content analyzed to further identify attributes critical in staying with or leaving the TAF.

The content analysis revealed 79 personality and other attributes presumably relevant for the job of an officer. After merging conceptually similar attributes, the list consisted of 72 attributes, conscientiousness, respect for the chain of command, honesty, orderliness, adaptability, military discipline, and planning as being among the frequently mentioned attributes.

### Study II

The purpose of Study II was to confirm whether the attributes identified in Study I were valid for the job of an officer in the TAF and to see how the attributes grouped together to form personality composites relevant for the job. Five more attributes were added to the list after a detailed examination of the written materials such as job descriptions and performance evaluation forms. Since majority of the attributes identified were positive in nature, six attributes with negative connotations were also included as the filler items to control for random responding. Therefore, the final list consisted of 83 attributes. Most frequently cited 20 attributes are presented in Table 1.

### Method

**Participants.** The original sample of the second study consisted of 500 officers (250 from military schools and 250 recruited from outside sources). Among the returned 481 surveys, 34 were identified as having outlier values in at least three items and hence were

excluded from the analyses. Major analyses were conducted with remaining 447 surveys/participants. The final sample was representative of the population of interest with a mean age of 34.4 years and mean tenure of 139.6 months. Ninety-one percent of the participants in the final sample were males, and while 41.2% were recruited from outside sources, 58.8 % graduated from military schools.

**Instrument.** The questionnaire was composed of two parts. In the first part the respondents were asked to rate the extent to which each attribute was relevant for the job of an officer as compared to the other jobs using a 9-point Likert type scale (1 = Not relevant at all; 9 = Very much relevant). In the second part, the respondents were asked to rate each attribute in terms of its importance for the job of an officer as compared to the other attributes, again using a 9-point Likert type scale (1 = Not important at all; 9 = Very much important). Page order was counterbalanced to deal with potential ordering effects. In addition to these ratings, participants answered a series of demographic questions of interest.

**Procedure.** The questionnaire was sent to the participants with a cover letter by the Turkish General Staff using internal mail system.

**Analysis.** A weighted composite score was computed for each item by multiplying the relevance and importance rating scores on that item. A factor analysis was conducted on the composite scores. Prior to the analysis, the six filler items and three other items with extreme variance were eliminated from the analyses.

### Results and Discussion

A principal component analysis with oblique rotation was performed using SPSS on the weighted composite scores of the remaining 74 attributes. In the initial analysis, 13 components were extracted with an eigenvalue over 1.00. However, examination of the solution indicated that some of the components had only a few items or were difficult to interpret. Investigation of the scree plot also indicated that the slope levelled off at the fifth component. As a result, the number of factors was set to five in the later analyses. Factor correlation matrix indicated the correlated factor structure (see Table 2), thus the use of an oblique rotation was further justified. Analyses

were repeated for the relevance and importance scores of the same items individually. Analysis on the importance and the weighted composite score ratings yielded almost identical solutions but the factor structure of the relevance ratings were quite different and did not make sense.

The results of the principal component analysis with oblique rotation on the weighed composite scores are presented in Table 3 . Cut off level of .35 was accepted for the inclusion of an item in a given component. Table 3 also includes factor loadings, communalities for each item, factor eigenvalues, explained variance, and internal consistency measures for each factor. Identified five factors explained the 49.53 % of the total variance. The communalities tended to be moderately high, only 8 of the 74 items had a communality value lower than .40. Although items with low communality values were not excluded from the interpretation of the factors, two of these items with relatively low communality values did not load on any component.

The first factor consisted of 18 items and explained 37% of variance. Except "trusting others" all items were conceptually consistent with each other, resembling the components of Conscientiousness factor in the Big-Five taxonomy (Costa & McCrae, 1995). Accordingly, this factor was named Conscientiousness/Self-Discipline. "Trusting others" had a negative loading (-.39) on this factor. In military context, trusting others may insinuate a lack of self-discipline or work bearing discipline. In other words, conscientiousness in military context may require not trusting easily. It could be argued that "trusting others" might have been perceived as violating the military's preoccupation with secrecy. This item also had positive cross loadings on two other factors, one named Self-Confidence, the other Agreeableness-Extraversion.

Thirteen items loaded on the second factor, and these items were mostly specific to the military context, such as respect to military hierarchy, military discipline, orderliness, strength of character. Therefore, this factor was labelled Military Factor or *M-Factor*. *M-Factor* was very stable, almost the same structure emerged regardless of the rotation and the extraction method employed in the analyses. *M-Factor* explained the 4.51 % of variance.

The third factor contained five attributes that tapped mostly self-assurance, like courage, risk-taking, and discretion. This factor was labelled Self-Confidence, and explained 2.88% of variance.

The fourth factor which included 11 items appeared to represent a combination of two of the Big-Five dimensions: Agreeableness and Extraversion, and therefore it was named Agreeableness-Extraversion. In military context extraversion and agreeableness may have similar meanings and functions with respect to performance. This factor explained 2.86% of the variance.

The final factor included nine attributes that were again context or job specific, such as leadership, achievement motivation, persuasiveness, and foresightedness. This factor explained only 1.95% of the variance. Since, most of the items loaded on this factor seemed to represent different aspects and/or functions of the military leaders, this factor was labelled Leadership.

Other than "trusting others" there were five other cross loading items. "Initiative" loaded on both Conscientiousness/Self-Discipline and Self-Confidence. Conceptually, initiative seems to be a product of self-confidence. At the same time, initiative could also be an indicator of the self-efficacy component of conscientiousness. Two other cross-loadings that made conceptual sense was the loading of "decision making" and "stress tolerance" on both Conscientiousness/Self-Discipline and Leadership. "Strength of character" was another attribute cross-loading on two factors, Conscientiousness/Self-Discipline and M-Factor. Finally, "determinedness" cross-loaded on both Self-Confidence and Leadership. The reason underlying the use of an oblique rotation was the expectation that identified attributes and hence the resulting factors would be related to each other. For that reason such crossloadings were not unanticipated.

### Conclusion

Existing evidence supports the view that job performance is multidimensional and that specific predictors tapping different dimensions or components of performance must be employed in the process of selection. Furthermore, it is believed that the conceptualization of domain of performance should include contextual aspects of performance along with job specific task performance.

The primary goal of the studies presented here was to identify personality attributes for the job of an officer in the Turkish Armed Forces. Accordingly, personality-oriented job analytic interviews were first conducted to identify personality attributes necessary for the job in question. Content analysis of the interviews led to a list of attributes presumed to be relevant. The attributes were then rated by a larger group of officers for relevance and importance and the analyses of these ratings resulted in five personality dimensions as being relevant for the job of an officer: Conscientiousness/Self-Discipline, Military Factor, Self-Confidence, Agreeableness-Extraversion, and Leadership.

The resulting factors confirmed our assertion that military jobs require personality attributes that are quite unique, along with attributes that are more likely to be relevant for a wide range of jobs. M-Factor and Leadership seem to be specific to the jobs in question, whereas Conscientiousness/Self-Discipline, Agreeableness-Extraversion, and Self-Confidence seem to be relevant for a wider range of jobs. M-Factor included items such as respect to chain of command, commitment, military discipline, and pride in uniform, which were quite job and context specific. Leadership included items like achievement motivation, persuasiveness, monitoring task progress and foresightedness, and determinedness which likely to be determinants of job success for military officers. Although the other three factors do not sound as job specific as the M-Factor and Leadership factor up front, they emerged as important components of criterion domain for the job in question.

Conscientiousness explained more than two thirds of the variance in the factor analysis. Conscientiousness is among the most widely studied personality attributes in the area of personnel selection. Although it has been shown to be meaningfully related to different job performance criteria for a range of jobs (Mount & Barrick, 1998), conscientiousness has been shown to be more related to motivational aspects of performance than ability (Mount & Barrick, 1995). Compared to the other four factors that emerged in the present analyses, conscientiousness seems to be a relatively broad factor. Despite relatively low levels of variance explained by the other four factors, we do not think that a single factor solution would be appropriate.

We believe that the remaining four factors, especially M-Factor, which stayed completely stable across different solutions using different ratings (i.e., composite, relevance, and importance), are critical in understanding performance of officers in the TAF.

One could also argue that the reason Conscientiousness emerged so strongly was because of the nature of the job analyzed. The job of military officer is a broad category including a wide range of jobs differing in both content and requirements. Some of these jobs are traditional military positions, whereas others are basically regular jobs carried within a military environment. Number of participants in the second study did not permit for repeating the analyses for different subgroups of jobs. If analyses had been repeated for specific job groups, different factor structures could have been emerged. Consistent with the literature suggesting the generalizability of the predictor of conscientiousness across jobs, conscientiousness could well be one of the major common denominator of the different officer jobs in the TAF. Pooling of different jobs under the job of officer can also explain the relatively low amount of total variance explained in this research.

Despite these problems, however, resulting factor structure was rather parallel to the Borman and Motowidlo's (1993) conceptualization of soldier effectiveness. Borman and Motowidlo argued that "soldier effectiveness involves more than just performing assigned job duties effectively and that other elements contributing to soldier effectiveness are common to all or nearly all soldiering jobs in the army" (p. 78). As an earlier step in defining the criterion domain for Project A (Campbell, 1990), Borman and colleagues developed a model of soldier effectiveness which comprised of three dimensions: Determination, Teamwork, and Allegiance. Determination included behavioural indicators such as perseverance, reaction to adversity (stress tolerance), conscientiousness, initiative, and discipline. These indicators are very parallel to the attributes loaded under Conscientiousness/Self-Discipline factor in the present studies. Teamwork embraces cooperation, camaraderie, concern for unit goals, boosting unit morale, and leadership, indicators that are very congruent with the attributes that loaded on Agreeableness-Extraversion and Leadership factors in this paper. Finally, Allegiance included indicators like following orders, following

regulations, respect for authority, military bearing, and adjustment to the army, indicators that are very similar to the personality attributes loading on M-Factor.

Inclusion of job specific attributes as predictors in the selection process can be expected to improve the effectiveness of a selection system. As Hogan and Roberts (1996) argued, the nature of performance determines the type, and perhaps the band width, of the personality predictors used in personnel selection. The accuracy of the inferences made is expected to improve as the predictors and performance criteria become congruent. The five personality dimensions identified in the present studies appear to be important for the performance of an officer in the Turkish Armed Forces and hence they need to be taken into consideration in the selection process.

We believe that personality attributes are important determinants of job performance and thus need to be taken into consideration in both job analyses and resulting personnel activities, especially selection. However, this is not to say that personality variables can replace other predictors. Inclusion of such individual differences variables that are known to be related to criterion of job performance variables is expected to add to the effectiveness of a given system.

Finally, the purpose of the studies presented here was to identify personality dimensions to be considered in personnel selection. Results of the factor analysis are going to be taken as a guide in the development of job specific personality tests. However, whether the identified personality dimensions will successfully predict job performance criteria depends largely on how these predictors and the criteria of performance are assessed.

## References

- Arvey, R. D., & Murphy, K. R. (1998). Performance evaluation in work settings. *Annual Review of Psychology*, 49, 141-168.
- Ashton, M. C. (1998). Personality and job-performance: The importance of narrow traits. *Journal of Organizational Behavior*, 19, 289-303.
- Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44, 1-26.



- Borman, W. C., Hanson, M. A., & Hedge, J. W. (1997). Personnel selection. Annual Review of Psychology, 48, 299-337.
- Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.), Personnel selection in organizations (pp. 71-98). San Francisco, CA: Jossey-Bass.
- Campbell, J. P. (1990). An overview of the army selection and classification project (Project A). Personnel Psychology, 43, 231-239.
- Costa, P. T., Jr., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the revised NEO personality inventory. Journal of Personality Assessment, 64, 21-50.
- Ghorpade, J. (1988). Job analysis: A handbook for the human resource director. Englewood Cliff, NJ: Prentice Hall.
- Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions. American Psychologist, 51 (5), 469-477.
- Hogan, J., & Roberts, B. W. (1996). Issues and non-issues in the fidelity-bandwidth trade-off. Journal of Organizational Behavior, 17, 627-637.
- Hough, L. M., Eaton, N. K., Dunnette, M. D., Kamp, J. D., & McCloy, R. A. (1990). Criterion-related validities of personality constructs and the effect of response distortion on those validities. Journal of Applied Psychology, 75 (5), 581-595.
- McCloy, R. A., Campbell, J. P., & Cudeck, R. (1994). A confirmatory test of a model of performance determinants. Journal of Applied Psychology, 79, 493-505.
- McCormick, E. J., Jeanneret, P. R., & Mechem, R. C. (1972). A study of job characteristics and job dimensions as based on the Position Analysis Questionnaire (PAQ). Journal of Applied Psychology, 56, 347-368.
- Motowidlo, S. J., & Van Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. Journal of Applied Psychology, 79, 475-480.
- Mount, M. K., & Barrick, M. R. (1995). The Big Five personality dimensions: Implications for research and practice in human resource management. Research in Personnel and Human Resource Management, 13, 153-200.
- Mount, M. K., & Barrick, M. R. (1998). Five reasons why the "big five" article has been frequently cited. Personnel Psychology, 51, 849-857.
- Murphy, K. R., & Shiarella, A. H. (1997). Implications of the multidimensional nature of job performance for the validity of selection tests: Multivariate frameworks for studying test validity. Personnel Psychology, 50, 823-854.
- Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance. Journal of Applied Psychology, 78, 679-703.
- Ones, D. S., & Viswesvaran, C. (1996). Bandwidth-fidelity dilemma in personality measurement for personnel-selection. Journal of Organizational Behavior, 17, 609-626.
- Raymark, P. H., Schmit, M. J., & Guion, R. M. (1997). Identifying potentially useful personality constructs for employee selection. Personnel Psychology, 50, 723-736.
- Salgado, J. F. (1997). The five factor model of personality and job performance in the European Community. Journal of Applied Psychology, 82, 30-43.
- Van Scotter, J. R., & Motowidlo, S. J. (1996). Interpersonal facilitation and job dedication as separate facets of contextual performance. Journal of Applied Psychology, 81, 525-531.

Table 1  
Frequently Mentioned Attributes

Attribute	Frequency (N = 78)
Work discipline	46
Planning	43
Verbal communication	36
Openness to experience	34
Coordination	32
Written communication	31
Job-specific knowledge	31
Managerial talent	30
Respect to chain of command	29
Honesty	27
Interpersonal relations	26
Crisp appearance	25
Military discipline	25
Pride in occupation	22
Superior-subordinate relations	22
Hardworking	21
Adaptability	17
Emotional stability	16
Time management	15
Orderliness	15

Table 2  
Factor Correlation Matrix

Factor	F1	F2	F3	F4	F5
F1. Conscientiousness	1.00				
F2. Military Factor	.44	1.00			
F3. Self-Confidence	.31	.25	1.00		
F4. Agreeableness- Extraversion	.40	.34	.34	1.00	
F5. Leadership	.44	.30	.18	.38	1.00

Note. Extraction Method: Principal Axis Factoring with Rotation Method of Oblimin with Kaiser Normalization.



Table 3  
Results of Factor Analysis

Item	F1	F2	F3	F4	F5	$h^2$
Job-specific knowledge	.62					.55
Problem solving	.61					.61
Work discipline	.56					.47
Fairness	.53					.48
Time management	.52					.66
Planning	.47					.50
Perseverance	.46					.59
Initiative	.46		.44			.54
Verbal communication	.45					.47
Decision making	.45				.35	.54
Managerial talent	.45					.44
Team player	.44					.56
Openness to experience	.44					.53
Stress tolerance	.43				.37	.46
Mentoring	.42					.38
Trusting others	-.39		.39	.35		.33
Thriftiness	.37					.52
Secretiveness	.36					.35
Attentiveness	.35					.50
Self-control						.56
Intrinsic motivation						.54
Rationality						.50
Respect to chain of command		.79				.59
Commitment		.78				.59
Military discipline		.77				.57
Pride in uniform		.60				.53
Superior-subordinate relations		.57				.55
Morality		.56				.45
Crisp appearance		.55				.49
Honesty		.53				.38
Pride in occupation		.50				.47
Respect for family life		.46				.44
Orderliness		.42				.56
Strength of character	.36	.39				.50
Trustworthiness		.35				.40
Knowledge of rules and regulations						.50
Adaptability						.63
Frankness			.61			.49
Courage			.53			.54
Risk-taking			.52			.40
Self-confidence			.49			.44
Discretion			.43			.35
Interpersonal relations				.66		.73
Tolerance				.65		.54

Table 3 continued

Item	F1	F2	F3	F4	F5	h <sup>2</sup>
Sociability				.65		.62
Egalitarian				.62		.49
Empathy				.61		.56
Agreeableness				.57		.57
Negotiating				.55		.55
Assertiveness				.53		.59
Culturedness				.51		.46
Consulting				.45		.58
Coordination				.44		.64
Feedback seeking				.38		.54
Self-monitoring				.37		.51
Participation				.37		.61
Practicality				.35		.42
Written communication						.51
Quality orientation						.51
Emotional stability						.29
Leadership					.53	.42
Achievement motivation					.49	.55
Persuasiveness					.44	.42
Monitoring task progress					.43	.40
Foresightedness					.42	.23
Critical thinking					.41	.49
Tolerance to frustration					.41	.50
Determinedness			.36		.37	.55
Making personal sacrifices					.35	.40
Patience					.35	.48
Tolerance to ambiguity						.14
Creativity						.59
Mannerism/Bearing						.40
Perfectionism						.43
Eigenvalues	27.63	3.34	2.13	2.12	1.44	
Explained Variance ( % )	37.33	4.51	2.88	2.86	1.95	
Internal Consistency ( $\alpha$ )	.93	.89	.75	.93	.83	

Note: Extraction method is Principal Component with Rotation Method of Oblimin with Kaiser Normalization. F1: Conscientiousness/Self-discipline; F2: Military (M-) Factor; F3: Self-Confidence; F4: Agreeableness-Extraversion; F5: Leadership.

# Officer Selection in the 21<sup>st</sup> Century

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## Summary

A key requirement in designing selection systems is determining the attributes of people that underlie their successful performance on the job of interest. The present paper considers junior officer attributes which may be needed for successful performance in the 21<sup>st</sup> century. This paper examines the application of a methodology and findings from a project examining future attributes needed for noncommissioned officers. It examines projected future changes in the world and the Army environment and considers how these may affect future officer job demands. It then draws inferences about the implications of these changes for the following attributes: general cognitive ability, integrity, achievement motivation, judgment and decision making, social competence, adaptability, communication ability, emotional stability, and physical fitness. While the available information is judged to support the importance of these attributes for the period 2000-2025, the limitations of such information are emphasized. A more thorough analysis using the approach followed in the noncommissioned officer project (NCO21) is recommended.

## Introduction

Although there are many components of a successful selection system, perhaps the most fundamental is that the selection criteria are aligned with the job for which the individual is being selected. As we look at the dramatic changes in geopolitics, technology, and U.S. Army missions that have occurred within the last 20 years and are projected to occur over the next 25 years, it is reasonable to ask whether the components of the Army officer job can be viewed as stable over that time and whether it is time to

reconsider the selection criteria that are currently being used.

How are we to answer these questions? How are we to determine whether it is time to change current selection criteria, and, if so, how are we to determine what the new criteria are to be? In theory, there is a standard set of industrial-organizational principles for generating a valid set of selection measures: analyze a job to identify its major components, determine what knowledges, skills, and attributes (KSAs) are needed to be successful in this job, build measures of these KSAs, and link these measures to measures of job performance. If this process results in the identification of measures which can add substantial incremental validity to the current selection criteria, then one must seriously consider changing these criteria.

While the application of these principles is straightforward when the job of interest is one that is currently being performed, it is not so straightforward when the relevant job is one that is projected to exist in the future. We cannot, in fact, ignore the future if we are to ensure that whatever conclusions we reach do not become obsolete shortly after we reach them. The changes that are occurring are so dramatic that if we do not in some way take them into account, either to identify KSAs that are not now currently important but are projected to be important soon, or to determine that the KSAs that are now important will remain so, then we risk having a seriously deficient selection system.

The problem we face, then, is how to build an officer selection system for the future. We are currently conducting a project addressing a very similar question: how to build an NCO

promotion system for the future. We believe that many of the procedures used in this project, 21<sup>st</sup> Century NCOs (NCO21), apply in varying degrees to the officer selection problem, and will in this paper discuss the manner in which we think they apply. We will also discuss findings from this project and others and what relevance we think they have to the issue of officer selection.

If we are to design a selection system for the future, it must be keyed to future job demands. Most job analytic techniques are designed to describe present, not future jobs. However, Schneider and Konz (1989) have developed a technique known as strategic job analysis, which identifies job components based on current job analysis, then makes projections concerning future changes and examines how these changes might impact upon these components. Much of this paper will discuss what is now known about officer jobs, what we have learned about future changes, and how these changes might impact upon future officer jobs. However, since we have not formally conducted a strategic job analysis on officers, this discussion must be recognized as speculative and preliminary. Officer selection is too important to rest upon such speculation—it is our recommendation that a formal job analysis be done to generate more definitive conclusions.

We must recognize at the outset that there is no single officer job. Officer job demands vary by specialty and by rank. We will narrow our inquiry by focusing primarily on entry-level lieutenant requirements which are reasonably common across specialties. A reasonable demand on a selection system is that it identify those who will perform effectively in their first job assignment. It is incumbent upon the promotion system to then identify who among these will perform well at higher levels. Of course, since the Army promotes from within, one wants to ensure that among those who are selected there are a sufficient number who have the capability to perform successfully at these levels. Thus, while performance at the junior level is the primary concern, it is not the sole concern.

An earlier paper (Rumsey, 1998) reviewed a variety of analyses of junior officer jobs and found that officer demands were generally identified based on either function or process. The following functions emerged as particularly important: “1) perform technical and

tactical tasks, 2) supervise subordinates, 3) develop subordinates, and 4) perform managerial and administrative tasks (p. 2).” The processes identified as needed to perform these functions were: “Planning, organizing, communicating, counseling, and decision making (p. 2).”

Projections into the future are necessarily uncertain, and become more uncertain the farther into the future they are made. In our 21<sup>st</sup> Century NCOs project, we have focused on two eras that are particularly meaningful to the Army: the era from 2000 to 2010, which has been labeled Army XXI (AXXI), and the following era, which has been called the Army After Next (AAN) and, more recently, the Army After 2010. For purposes of this paper, we are equating this second era with the years 2010 to 2025. The use of these guideposts allows us to link our projections with those the Army is making and provides some reasonable limitations to our planning horizons.

## Army XXI

### *General Characteristics*

The foremost characteristic of Army XXI will be an emphasis on digitization in and in support of military operations. This digitization will be particularly prominent in battlefield communications, which will enhance situational awareness, and in weapons systems.

Another projected prominent characteristic of Army XXI will be an increasing diversity of missions, including peacekeeping, peacemaking, humanitarian missions, and domestic assistance. As new technology comes on line there will also be, as a third characteristic, a diversity of forces, with some units operating with new equipment and enhanced capability and others operating with less advanced equipment.

A fourth characteristic will be decentralized operations. With increased firepower range and improved communications, doctrine will dictate greater dispersion among friendly units.

Training will also undergo evolution, with increased reliance on such technology-driven techniques as distributed training, distance learning, Internet training and computer-based

instruction, less emphasis on institutional attendance, and more on self development.

#### *Implications for Junior Officer Functions and Processes*

In our *NCO21* project, we have used projected characteristics of Army XXI, which expand on those presented above, and other information and judgments about this future era, to draw implications about how NCO job dimensions might change. While these implications were necessarily tentative, they did at least draw on judgments from those who were particularly knowledgeable about present NCO jobs and projected changes to those jobs. We do not have this advantage for lieutenants. What we have for lieutenants is some fairly general information about job functions and processes, in some respects rather dated, and our own speculation about how these functions and processes might change as a result of the characteristics identified and some reasoning by analogy based on projected changes to NCO jobs. These are precautionary statements given so that the speculative nature of the discussion presented below will be properly understood. The objective of this exercise is to both generate a few tentative suggestions about future lieutenant requirements and to provide an illustrative example of what kinds of conclusions might be drawn about lieutenants if the methodology we applied in *NCO21* were properly applied to the issue of officer selection. These suggestions are discussed below.

#### *Perform Technical and Tactical Tasks.*

Two projected trends are noteworthy here. First, the technical components of an officer's job are likely to become more complex. Three dimensions which have been associated with task complexity (Campbell 1988; Schroder, Driver, & Streufert 1967; Zaccaro, 1996) are likely to increase: (1) information load, (2) information diversity, and (3) rate of information change. With respect to information load, Hunt and Phillips (1996, p. 3) noted that "Information flow and amount are increasing at an exponential rate; leaders will have to sort out critical information from high volumes of data."

Information diversity is likely to increase as well. Officers will face a variety of potential enemies, assignments, environments, and equipment, with each factor adding to information complexity.

Rate of information change is also likely to accelerate. Because of technological advances and increased variety of missions, the number and nature of tasks will likely change during an officer's career, sometimes very rapidly. The officer will need to be continually learning to deal with these changes.

A second trend involves "increased exposure to differing ethnicities and cultures. Peace keeping and humanitarian missions will bring the Army into contact with different peoples. Moreover, while the AOE [i.e., Army of Excellence, a term used to describe the Army of the 1990s] tended to be insular, the nature of future deployments (joint, coalition, host nation, NATO, UN, other government and non-government participation, civilian contractor supported functions) will expose Army members to new relationships (Ford, Campbell, Campbell, Knapp, & Walker, 1999, p. C-13)."

*Supervise Subordinates.* Our 21<sup>st</sup> Century *NCOs* project has identified a number of factors which will likely make supervising subordinates more challenging in Army XXI. First, non-traditional deployments, such as those involving assistance and humanitarian purposes, "often involve soldiers performing missions that are not entirely consistent with what they perceive their Army jobs and roles to be (Ford et al., 1999, p. C-14)." This will likely make motivation of subordinates more difficult.

Second, junior officers will need to deal with ethnic and cultural diversity: "The Hispanic youth population will increase to 20-25% of the total youth population by 2010. Urban youth will predominate. (Ford et al. 1999, p. C-21)."

*Develop Subordinates.* Developing subordinates will also be impacted by changes associated with Army XXI. Steinberg and Leaman (1990) identified a number of training requirements for platoon leaders, noting that the "most prominent leadership area for platoon leaders was Train in the Field to Enter Combat (p. 44)." The trend to shift more skill learning to the unit and the innovations in training technology will place a greater training burden on the lieutenant. There may be a greater need to apply different training strategies and training methods to match different ability groups.

*Perform Managerial and Administrative Tasks/Decision Making.* Digitization will offer a variety of applications, as well as presenting problems when digital systems fail. It can thus be expected to increase managerial, administrative, and decision making requirements for junior officers.

Future deployments can be expected to present junior officers with additional managerial and administrative requirements as they provide input to decisions on how to staff these deployments. These deployments may rely more on *ad hoc* arrangements than on more traditional personnel structures, further complicating the decision making process involved. Unconventional missions are more likely to involve unanticipated situations, requiring officers to solve problems with unfamiliar elements. Unconventional and other decentralized operations are also likely to provide junior officers with an opportunity to make decisions that historically have been made at a higher organizational level.

*Planning and Organizing.* Non-traditional missions tend often to involve relatively small units, with the result that lieutenants can be expected to take on greater planning and coordinating responsibilities with respect to these missions.

*Communicating/Counseling.* Lieutenant communication responsibilities include maintaining two-way information exchange with supervisors and subordinates, communicating performance standards to subordinates, and telling soldiers when they are performing well (Steinberg & Leaman, 1990). The growing reliance on computer communication, including e-mail, will put pressure on lieutenants to communicate effectively in this medium. Also, "the ability to speak rationally and convincingly and keep others informed" will be particularly important to deal with the uncertainty associated with deployments and non-conventional missions (Ford et al., 1999, p. C-13).

#### *Implications for Junior Officer Attributes*

As we move from implications for functions and processes to implications for attributes, our exercise becomes even more speculative. We are generating inferences based on inferences. It should be understood that what we are offering here is only a starting point—a set of speculative suggestions rather than a set of

conclusions based on systematic research on officers. Again, the methodology applied in NCO21 provides a basis for generating more solidly based judgments although, since we are dealing with the future, even judgments drawn using that methodology contain a substantial element of uncertainty.

What we would like to do at this point is identify a set of attributes that we think merit particular attention in thinking about future officer selection. We would like to begin by looking at those KSAs which military and psychologist subject matter experts agreed would likely be important for mid-level NCOs functioning in Army XXI. These included the following: judgment and decision making skill, general cognitive aptitude, directing, monitoring, and supervising others, motivating and leading others, oral communication skill, and training others. Each of these was ranked in the top ten by both expert groups. In addition, integrity and discipline, conscientiousness, and job-specific knowledge and skill were ranked in the top ten by one group and the top fifteen by the other (Ford et al., 1999). For our purposes, we will view three KSAs from these lists, directing, monitoring and supervising others, motivating and leading others, and job-specific knowledge and skill, not as attributes but as behavioral dimensions which may be predicted by one or more attributes.

Now we are faced with a daunting question: If we were to accept these KSAs as the important ones for Army XXI mid-level NCOs, to what extent would they be applicable to junior officers as well? That is, what important attributes for officers are omitted from this list, and what attributes that are important for NCOs are not sufficiently important for officers to be considered in a selection context? One attribute that is not included that may well apply to future officers is adaptability. TRADOC Pamphlet 525-5 (Training and Doctrine Command, 1994) anticipated an era in which "complex, adaptive armies (p. 2-5)" would need to adapt to a variety of operations. It thus stated that "Increased flexibility and adaptability will be required at all levels (p. 4-10)."

In comparing the list of mid-level NCO attributes with models of executive leadership (e.g., Zaccaro, et al., 1997) the primary difference seems to be the greater emphasis on cognitive skills in the latter. Also, some noncognitive attributes which are important at lower levels may

be less so at higher levels. Indeed, in our *NCO21* project, conscientiousness was ranked as the most important KSA for promotion to junior NCO but was not listed in the top ten by either panel for promotion to senior NCO.

Based on these considerations and the implications for junior officer leadership drawn from the *NCO21* project, the following attributes were identified, on a preliminary, tentative basis, as deserving particular attention as we think about officer selection for Army XXI. *These are not listed in ranked order.*

- General cognitive ability
- Integrity
- Achievement motivation
- Judgment and decision making
- Social competence
- Adaptability
- Communication ability

*Cognitive Ability.* Let us first consider cognitive ability. Higher order cognitive abilities and skills have been related to higher organizational levels (e.g., Jacobs & Jaques, 1987, 1991; Streufert & Streufert, 1978; Streufert & Swezey, 1986). It has been postulated (Rumsey, 1998, p. 6) that "the operating environment of the 21<sup>st</sup> century will require greater exercise of higher order cognitive abilities and skills in two ways: 1) by increasing the responsibility of lieutenants such that they will, in effect, be operating at a higher organizational level and will need to apply the higher order cognitive abilities and skills required for success at these levels, and (2) by directly increasing the task complexity of the lieutenant's job."

As noted above, increases in information load, information diversity, and rate of information change can be expected to increase task complexity at the junior officer level. Why might we expect an increase in responsibility at the lieutenant level? TRADOC Pamphlet 525-5 (Training and Doctrine Command, 1994, p. 2-8) noted that "New communication systems will allow nonhierarchical dissemination of intelligence, targeting, and other data at all levels. The new way of managing forces will alter, if not replace, traditional, hierarchical command structures with internetted designs....Because this internetted structure can diffuse command authority, new leadership and command structures will be required in many militaries."

Similarly, Kilcullen and Goodwin (1998, p. 2) noted: "The lightning pace of 21<sup>st</sup> Century warfare may require delegation of more decision-making to junior officers, and the lethality of new weapon systems increases the chance that the actions taken by these officers will have a critical impact on the battle's outcome."

A variety of critical cognitive skills are suggested by the projected future officer demands we have discussed. As an earlier paper (Rumsey, 1998, p. 7) noted: "...it seems reasonable to expect that the Army of the future will need officers who can effectively acquire, retain, retrieve and apply information needed to solve problems and make decisions, who can develop strategies for knowing which problems to solve and which decisions to make, for deciding which information is important and which is not, and who can develop and apply strategies for dealing with multiple inputs in a coherent, integrated fashion." We will devote additional attention to problem solving as part of our discussion of *judgment and decision making* below. These skills are linked to Sternberg's concept of analytic intelligence (1994, 1996). Sternberg has identified two other types of cognitive abilities: creative intelligence, or "the need to be flexible and see old problems in new ways (1994, p. 321)," and practical intelligence, which is based more on experience than formal training or education (1994). The variety and novelty of projected missions and assignments in the Army XXI era suggest that creativity and practical intelligence will be important junior officer attributes as well.

*Integrity.* Rather than listing integrity and conscientiousness as separate attributes here, we will focus on integrity and suggest that one's definition of this term should be sufficiently broad to capture much of the meaning of conscientiousness as well. Professional ethics was identified as the most important of nine Army competencies by a group of predominantly company-grade officers (Savell, Tremble, & Teague, 1993). Integrity has received consistently high ratings by NCO judges in our *NCO21* project (Ford et al., 1999; Rumsey, Busciglio, & Simsarian, 1997). In future deployments, where junior officers may not be closely supervised but where their actions could have profound consequences, the importance of this attribute may be particularly great.



*Achievement Motivation.* Although effort and initiative was listed separately from need for achievement and general energy level in *NCO21*, all of these are incorporated here under the term *achievement motivation*. In Army XXI, officers will be frequently faced with new assignments and new missions in which their previous training and experience will have only limited value. Individual effort and initiative will be important in helping officers meet these new challenges, both by direct action and through continuous self development.

*Judgment and Decision Making.* Problem solving, a component of decision making, is incorporated in Sternberg's (1996) definition of analytic intelligence. Thus, it may be puzzling to see these listed here separately from general cognitive ability. However, Zaccaro et al. (1997) presented a model of leadership which also separated problem solving and general cognitive abilities.

The fact that the judges in the *NCO21* project listed both decision making and general cognitive ability among the top-ranked KSAs for mid-level NCOs and rated decision making as the third-ranked KSA for senior NCOs in Army XXI suggests that, while it certainly could be considered a cognitive task, one should probably closely consider whether a separate measure for decision making should be considered for officer selection even if a general cognitive ability test is already available. The increased availability of digital tools and other sophisticated equipment, the proliferation of unconventional missions, the increased operational autonomy and responsibility in the Army XXI environment, which were presumably factors feeding into these judgments of the importance of decision making for NCOs, will all also likely challenge the junior officer's ability to use good judgment, to make effective decisions, and to solve problems in Army XXI.

*Social Competence.* Social competence is a rather broad concept, and perhaps is best viewed as a constellation of abilities, including the ability to understand social cues, the ability to act effectively in social situations, and the ability to influence others.

Supervision of subordinates, as noted above, is an important component of the junior officer's job. Directing and supervising others, the third highest ranked KSA for mid-level NCOs, can

be viewed as a behavioral indicator of social competence. Motivating and leading others, the fourth-ranked KSA for these NCOs, is another. As decentralized operations increase, the ability of junior officers to work effectively and closely with subordinates in small groups will become more important. Also, officers are likely to be more challenged by the soldiers they are leading and by the diversity of these soldiers, as well as by the diverse cultures and social situations they are likely to encounter in Army XXI deployments. As less hierarchically oriented forms of communication and operation begin to predominate, officers will likely need to engage in more participative forms of leadership.

*Adaptability.* Officers will be faced with a variety of technical environments, geographic environments, and missions. "Nontraditional missions, urban orientations, new political realities, and ill-defined or rapidly changing threats can cause confusion and ambiguity (Ford, et al. 1999, p. C-13)." Missions will change and tasks will change. Peacekeeping and other unconventional missions are particularly likely to involve complex and unpredictable situations that officers will need to deal with.

Adaptability may not be a single attribute, but rather a combination of attributes. Pulakos, Arad, Plamondon, and Kiechel (1997) described a project being conducted for the Army Research Institute which is examining cognitive abilities and such non-cognitive characteristics as openness, flexibility, and tolerance of ambiguity as predictors of adaptive performance.

*Communication Ability.* We have addressed issues relating to the future importance of communication ability under the discussion of the officer processes *communicating/counseling* above. Communication is, like some of the other "attributes" described above, perhaps best viewed as a constellation of attributes rather than a single attribute. Certainly some measures of general cognitive ability would incorporate some features of communication ability. However, the judges in our *NCO21* project gave oral communication skill a high ranking even when general cognitive ability was included as a KSA, so we should not assume that a general cognitive measure would sufficiently encompass the features of communication ability that the judges felt were important.



## Army After 2010

### *General Characteristics*

Some of the projected characteristics of Army After 2010 that are useful in considering relevant junior officer characteristics are: (1) the emphasis on knowledge, (2) the emphasis on speed, (3) the concept of hybrid forces, and (4) the concept of Battle Forces.

**Knowledge.** "Knowledge" has an absolute and relative side. Absolutely, it means knowing all that we need to know; relatively, it means having much better information than the enemy ('information dominance'). A wide range of capabilities is implied, including these: giving commanders a view of the location and condition of all of our human and material assets ('total asset visibility'); giving forces a common, complete, accurate, and current picture of the battle situation at the level they need to know it; knowing enemy locations, actions, forces, and intentions; synchronizing the many parts of our joint and coalition forces; and denying an enemy comparable knowledge. Knowledge will let us maintain advantages of position to initiate surprise, standoff engagements instead of predictable force-on-force ones (Ford et al., 1999, p. C-26)."

**Speed.** "The complement to Knowledge, 'Speed,' is required at the strategic, operational, and tactical levels. The AAN vision calls for Battle Forces in a high state of readiness to deploy themselves within days to anywhere in the world....As a matter of tempo, speed involves maintaining a continuous pace of operations until each objective is achieved. Knowledge encourages speed by permitting forces, with awareness of friendly and hostile locations, to avoid overmatch, and make every move count (Ford et al., 1999, p. C-26)."

**Hybrid Forces.** The force of 2025 will be a hybrid force, composed of a number of components, including Army XXI forces and other more traditional forces, as well as a component particularly designed for the challenges of the 2010-2025 timeframe, the Battle Forces. It is on the Battle Forces that we focus on to identify requirements that may go beyond those required of AXXI officers.

**Battle Forces.** It should be understood that the concept of Battle Forces, while it is based on recent sources, is subject to revision. Part of

this concept involves organization in small teams, mixing of roles across ranks, and cross-training of team members, who are multifunctional in terms of being able to conduct diverse activities and participate in diverse missions. The concept of Battle Forces is in many ways comparable to the concept of Special Forces.

### *Implications for Junior Officer Functions and Processes*

There are just a few implications for the officer functions and processes that we are considering that we would like to highlight here.

**Perform Technical and Tactical Tasks.** It is expected that Battle Force soldiers and leaders will need to be multi-skilled. Their jobs will be more complex, less standardized and less proceduralized with more individual innovation required. Jobs will require constant, career-long learning to keep up with changing systems. The spread of computerization will likely increase, requiring sophistication in understanding computers and maximizing their use by officers. The quantity of available information will likely continue to increase, so "[p]rocessing large amounts of information with speed, accuracy, discipline, and discrimination....(Ford, et al. 1999, p. C-40)" will probably be required.

**Supervise Subordinates.** "Directing and supervising in the Battle Force environment will be a more shared, collaborative effort rather than a sole responsibility of those 'in charge' (Ford, et al. 1999, p. C-41)." Leader roles are expected to be more fluid.

**Develop Subordinates.** Training in the Battle Forces will involve more learning by apprenticeship, so officers who are comfortable with this type of arrangement will be more likely to effectively perform their training roles.

**Decision Making.** Battle Force leaders will need to be effective decision makers in a variety of complex, uncertain, and changeable environments, using a variety of sophisticated equipment, under conditions of high stress.

**Communicating.** "Conveying thoughts, ideas, conclusions, and recommendations will be a critical part of BF [Battle Force] operations. While relaying of much information will be automated, the human ability to communicate effectively will be, if anything, more vital to BF

[Battle Force] operations. The ability of individuals to organize, present, conduct, and respond to verbal and non-verbal communications will be crucial (Ford, et al., 1999, p. C-41)."

#### *Implications for Junior Officer Attributes*

When we asked military and psychologist subject matter experts to identify knowledges, skills and abilities that Battle Force NCOs would need in the Army After 2010, the two panels had general agreement that the following were important: judgment and decision making, general cognitive ability, knowledge of battlefield function integration, emotional stability, general self-management skill, and self-directed learning skill. There was somewhat less consensus for adaptability, knowledge of system inter-relations and physical fitness (Ford et al., 1999).

For purposes of selection, our interest is more on abilities than on knowledges and skills, although the possibility that there are specific measurable attributes associated with general self-management skill and self-directed learning skill may merit further investigation. Many of the environmental factors related to general cognitive ability, adaptability, and problem solving in the Army XXI discussion above might be expected to be equally relevant in the Army After 2010 era. Task complexity will likely remain high. Junior officers will likely encounter a variety of situations that require flexible, adaptive, creative thinking. They will need to make decisions in a variety of complex, unstructured environments.

Emotional stability may become increasingly important, based on projections about the stressful nature of Battle Force operations. While the following observations are not focused specifically on officers, they provide a sense of the type of environment officers may need to operate in: "Battle Force soldiers will be used in combat situations that we currently cannot forecast. They may witness employment of WMD [weapons of mass destruction] including large-scale civilian casualties. They may be deployed while the U.S. homeland (and their families) are under missile or WMD threat or attack. They may be placed in situations that their training did not cover or be faced with unanticipated equipment failures. Invariably they will be expected to operate in very small groups and sometimes even alone. Battle Force elements can expect casualties that can

destroy team nucleus. All these factors will increase mental and emotional stress under conditions that we cannot yet anticipate (Ford et al., C-41)."

The emphasis on speed during military operations, particularly if these operations become extended, could place a premium on fitness. The following conclusions, while again not focused on officers, may nonetheless have relevance: "Fitness will likely have three components: physical, mental, and emotional. Physical fitness will likely be in terms of stamina and endurance rather than AOE characteristics of strength and leg speed. The ability to cycle, at will, between rest and activity may be increasingly important. Age, up to a point, may be incidental and the average age of the Battle Force soldier will likely be mid-30s. Mental fitness will include agility, comprehension, acuteness, and memory. Emotional fitness will probably require stress resistance (Ford et al., 1999, p. C-41)."

Integrity, achievement motivation, social competence, and communication ability were the other attributes discussed in the Army XXI section. These or related KSAs were given attention by our expert panels, but were not consistently ranked highly for NCOs by these panels. In general, the points made about these with respect to Army XXI above would seem to hold for Battle Force officers as well. Officers may well be in situations where a lapse of integrity could have significant consequences. Achievement motivation will likely be needed to help officers deal effectively with new assignments and new missions, and to help them pursue continual self development. The need for clear, effective communication, as noted above, will likely be critical to the success of Battle Force operations. The social ability to exercise leadership in a more participative manner will likely be as important, if not more so. The reduced rankings for these attributes or related KSAs for NCOs probably reflects a judgment not so much that these will become less important in a Battle Force context, but rather reflects the judged significantly greater importance of such attributes as judgment and decision making in that context. We must at least consider the possibility that there might be a comparable shift in relative importance of these attributes for officers, but we have no empirical data, even in judgment form, with which to test this hypothesis.

## Conclusions

The Army will need strong leadership to help it meet the challenges of the 21<sup>st</sup> century. The question in selection terms is: What attributes make a strong junior leader? The answer to that question is not independent of the environment the leader will be operating in or the functions the leader will perform. Thus, it is necessary to take a close look at leader functions in the context of future environments in attempting to identify these attributes. The exercise engaged in here should be considered more as a demonstration of an approach rather than an attempt to provide a definitive list of attributes. Since we have relied so much on information obtained from a focus on NCOs, this is best viewed as an indirect application of that approach. A more direct application would generate a more defensible list.

From our indirect approach, we do have some interesting hypotheses. The possible importance of judgment and decision making, either as a component of general cognitive ability or as a separate attribute, suggests a path worth pursuing, particularly as we look beyond the year 2010. General cognitive ability is likely to continue to be important, including analytic, creative, and practical components of this ability. Achievement motivation, adaptability, social competence, communication ability, and stress tolerance also look like potentially fruitful areas.

Clearly, identification of promising attributes is but a first step toward implementing any change to the current officer selection system. Other questions to be asked include: (1) Is the attribute adequately measured in the current selection system? (2) Can the attribute be measured accurately? (3) Does the attribute indeed predict the performance it is hypothesized to predict, and (4) Does the benefit of having this measure in the officer selection system justify the cost of developing and using this measure? We recognize that any changes to the current selection system involve some cost, and we clearly are not in a position now to judge whether expanding the current system would be a cost-effective step. However, we will suggest that it is a prudent step to periodically examine whether the officer selection system being used is actually selecting those who will serve the Army best, both now and in the future.

## References

- Campbell, D. T. (1988). Task complexity: A review and analysis. *Academy of Management Review*, 13, 40-52.
- Ford, L. A., Campbell, R. C., Campbell, J. P., Knapp, D. J., & Walker, C. B. (1999). *21<sup>st</sup> century soldiers and noncommissioned officers: critical predictors of performance*. Manuscript in preparation.
- Hunt, J. G., & Phillips, R. L. (1996). *1996 Army symposium: Leadership challenges of the 21<sup>st</sup> century Army. Executive Summary* (Research Note No. 96-63). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Jacobs, T. O., & Jaques (1987). Leadership in complex systems. In J. Zeidner (Ed.), *Human productivity enhancement. Volume 2: Organizations, personnel and decision making*. New York: Praeger.
- Jacobs, T. O., & Jaques (1990). Military executive leadership. In K. E. Clark & M. B. Clark (Eds.), *Measures of leadership*. Greensboro, N.C.: Center for Creative Leadership.
- Jacobs, T. O., & Jaques, E. (1991). Executive leadership. In R. Gal & A. D. Manglesdorff (Eds.), *Handbook of military psychology*, Chichester, England: Wiley.
- Kilcullen, R. N., & Goodwin, J. (1998). *Requisite attributes for 21<sup>st</sup> century combat leaders*. Unpublished manuscript.
- Pulakos, E. D., Arad, S., Plamondon, D., & Kiechel, K. L. (1997). *Examining the feasibility of developing measures of stress adaptability* (Tech. Rep. No. 1068). Alexandria, VA: U. S. Army Research Institute for the Behavioral and Social Sciences.
- Rumsey, M. G. (1998). *21<sup>st</sup> century lieutenants*. Paper presented at Cadet Command Study Group, Norfolk, VA.
- Rumsey, M. G., Busciglio, H., & Simsarian, S. (1997). *21<sup>st</sup> century NCOs*. Paper presented at the 9<sup>th</sup> Defense Analysis Seminar, Seoul, Korea.

Savell, J. M., Tremble, T. T., Jr., & Teague, R. C. (1993). *Some lessons learned about leadership in Operation Desert Shield/Storm* (Study Rep. No. 93-05). Alexandria, VA: U. S. Army Research Institute for the Behavioral and Social Sciences.

Schneider, B., & Konz, A. M. (1989). Strategic job analysis. *Human Resource Management*, 28, 51-63.

Schroder, H. H., Driver, M. J., & Streufert, S. (1967). *Human information processing*. New York: Holt, Rinehart & Winston.

Steinberg, A. G., & Leaman, J. A. (1990). *Dimensions of Army commissioned and noncommissioned officer leadership* (Tech. Rep. No. 879). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Sternberg, R. J. (1996). *Successful intelligence*. New York: Simon & Schuster.

Sternberg, R. J. (1994). The PRSVL model of person-context interaction in the study of human potential. In M. G. Rumsey, C. B. Walker, & J. H. Harris (Eds.), *Personnel selection and classification* (pp. 317-332). Hillsdale, NJ: Erlbaum.

Streufert, S., & Streufert, S. C. (1978). *Behavior in the complex environment*. New York: Wiley.

Streufert, S., & Swezey, R. W. (1986). *Complexity, managers, and organizations*. Orlando, FL: Academic Press.

Training and Doctrine Command (1994). *Force XXI operations*. (Pamphlet No. 525-5). Fort Monroe, VA: U.S. Army Training and Doctrine Command.

Zaccaro, S. J. (1996). *Models and theories of executive leadership: A conceptual/empirical review and integration*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Zaccaro, S. J., Mumford, M. D., Marks, M. A., Connelly, M. S., Threlfall, K. V., Gilbert, J. A., & Fleishman, E. A. (1997). *Cognitive and temperament determinants of Army leadership*. Manuscript in preparation.

# CHANGING JOB REQUIREMENTS IN RELATION TO REQUIRED ABILITIES OR PERSONALITY TRAITS DURING A MILITARY CAREER

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## Introduction

I started my military training at the Royal Military Academy in 1966. I have held several officer positions over the years (including those of company commander of an armoured infantry battalion). Over all these years I have needed knowledge, experience and skills to perform these jobs properly. In recent years I have been responsible for the psychological selection policy in the Royal Netherlands Army. In that position I was able to assist in the reassessment of the requirements. This was required because conscription in the Netherlands was suspended a few years ago and in addition the focus has shifted from large-scale, high intensity conflicts to smaller operations in which personnel are required to perform new tasks and different conduct is expected from officers.

## Content of the Paper

My paper reviews a Dutch exploratory survey by Wassenberg, which entailed interviews with some twenty former military personnel who have held positions as senior managers. The requirements set of senior management were catalogued on the basis of the study. I shall then proceed to deal with the differences in positions held by officers at the middle and lowest level. The requirements for officers at the various levels can be formulated on the basis of this comparison and the resultant differences. In view of the limited time available today, we can discuss them only summarily. My paper will round off with some concluding remarks.

## Some Observations in Advance

Before proceeding to explore the Wassenberg study, I should like to make some observations in advance. During my work as officer, I became extremely interested in the phenomenon of

leadership and management. There is a great deal of literature, albeit of variable quality, on this subject. The majority is fairly theoretical in nature, in the sense of it lacking empirical foundation. Descriptions and analysis of what actually happens are therefore rare. Sometimes texts served to set the norm, indicating what a good officer does. But many of these theories differed from my own experience of what I saw happening about me. This aroused my curiosity.

Before to continue, we must first define the three different levels of management in further detail:

- the lowest level is platoon and company commander;
- the middle level is battalion and brigade commander;
- the highest level (senior management) is army corps commander and in the Netherlands, Commander in Chief of the Royal Netherlands Army/Air Force/Navy and Chief of Defence Staff.

## Exploratory Study of Top-Level Management

The exploratory Wassenberg study was designed to further define the behaviour of senior managers, to "verify" a number of ideas and to gain some fresh insights. We opted for an approach which involved interviews with some twenty former military personnel who had acted as senior managers. There were two reasons for this. First of all, Wassenberg wanted to "spoil" the field of the definitive study as little as possible. He wanted to avoid those whom he had approached during the survey actually participating in the final study. That has, it must be said, a number of irritating effects. Secondly, the former managers have more time and are easier to approach. Finally – and what is more important still – they have some measure

of distance. Apart from the former senior managers, three who were still in active service were approached to give some idea of the current situation and also as a sort of "check".

The interviews were open in nature, the interviewees were free to answer the questions posed in the way they chose. First of all, they were asked to describe the highest post they had held. This was mainly to find out in more detail what activities were involved. The interviewer then proceeded to ask more about the whys and wherefores to form as solid a picture as possible. The differences were then raised with the positions held at middle and lowest executive level of the organisation. Finally, the interviewer asked about the qualifications/qualities specifically required for the most senior level and the way in which they had been acquired.

## Results

The results of the interview can be classified in three categories, which Wassenberg specifies as follows:

- a) Conceptualisation
- b) Planning and giving direction
- c) Leadership

### a) Conceptualisation

Conceptualisation is future-oriented. We are talking here about the *raison d'être* of the organisation and its contribution to safeguarding the world around us. The future is uncertain as a result of a wide variety of unpredictable developments. The time frame was generally some 5 to 10 years. To overcome this uncertainty, senior managers actively collect information on the future developments in the vicinity of the organisation. Some picture is then formed of how the world fits together and will fit together, and what are the most important causes and what the consequences are. In view of the lack of certainty, alternatives are developed regarding the most probable developments. Contacts are established and maintained with an entire network of relevant bodies and institutions to collect information. The literature is also eagerly studied, not just books

and journals connected with the organisation, but covering a wide range of subjects. The higher the position in the organisation, the more these activities were quoted.

In this manner, some picture of the surrounding world is established and subjected to ongoing adjustment. They then identify the threats lying in store for the organisation. These are interpreted as challenges demanding a satisfactory response. This results in thinking of alternative directions for solutions and boundaries within which the ultimate approach must remain. Finding them requires imagination and originality. In general, people confine themselves to a few alternatives to avoid failing to see the wood for the trees. It is then a matter of developing the most probable outcome. The question of which one is selected depends upon the question of whether this tallies in terms of possibilities within the organisation or within its environment. This requires sound knowledge and understanding of what is happening in the organisation and may happen, and the flexibility called for by the necessary changes.

### b) Planning and giving direction

Activities in this field are more concrete than those in the field of conceptualisation. They embroider upon what has been developed and explored at the conceptual phase. Sometimes, this implies operationalising them, sometimes the tasks are clearly given. The objective is to allow duties to be discharged at the lower level and to give them direction. This involves such matters such as job allocation, managing and controlling mutual dependency relationships between units, depending upon the requirements of the task, drawing up priorities for the allocation of resources to the units, co-ordination and control of activities over time. There is a heavy emphasis on planning and feedback. The net result of all this are procedures, instructions, guidelines and limits within which one must remain and criteria for assessing the result and/or the way in which it is achieved. The information required is gathered with a high level of focus on carrying out one's responsibilities. The thinking is based on facts and is concentrated on weighing up benefits and drawbacks. It is highly analytical, abstract and logical in nature.

### c) Leadership

Leadership is concerned with immediate dealings with employees. The aim is to induce and encourage them to fulfil their responsibilities as effectively as possible. Major elements are designating concrete duties, checking and motivation. Competence in professional skills and interpersonal skills play a predominant role. At the senior level, leadership is not confined to immediate subordinates, but also extends to the entire organisation. The employee at the lowest level must be convinced that the boss at the highest level knows what is going on and will do all he can to ensure that he can perform well. This remote leadership is disputed in the literature, but almost all those interviewed quoted it as an essential point. There is strong support for this from studies in the Israeli armed forces.

### Comparison of Levels

The most striking difference with the middle level lies in the breadth of the field of vision, the time perspective and the degree of concreteness. The most senior managers have a view of the surrounding world and the entire organisation. At the middle level that view is generally confined to one's own unit and "adjacent" units. The future timescale is also limited to a maximum of a few years. Contacts with the world in which the organisation operates are also less frequent and within the organisation they are mainly focused on what is required to perform the job. The activities cover operationalising what has been handed down "from above", planning and implementing it. Senior managers do the same, but at the middle level the range is much smaller and the tasks more concrete. Dealing with direct subordinates is more directive than at the senior level. The contrast with management positions at the lowest executive level is even greater. The emphasis there is on applying professional and personal skills. The time frame varies from the here and now to a few months. Contacts are mainly confined to the immediate unit.

At the lowest level, the managerial task is very much the dominating feature. In addition, the provision of information to one's own unit and improvising make up a significant proportion of the duties. All these activities call upon personal, communicative and professional skills as well as a talent for improvisation. In view of the limited

time available, I cannot go any further into the qualities required.

At the middle level, it is a question of such activities as allocating resources and acting as monitor and liaison, spokesman and figurehead. This makes heavy demands upon cognitive and analytical skills. Within this complex of activities, providing leadership, providing information and 'trouble shooting' are still a feature. However, in a different way from the lower level, it is more a question of creating conditions under which things can be carried out. In view of the enormous volume of information and lack of time, important matters have to be quickly distinguished from secondary matters. Finally, middle managers require more social and communicative skills.

We can conclude from the Wassenberg study that virtually all respondents are of the opinion that operating at the senior level demands special qualities. This very much calls upon intellectual capacity, which includes logical, analytical and abstract thinking. In addition, integrative skills are indispensable. The latter entails the capacity to form an overall picture of the setting, organisation and oneself as well as developments within them, looking to the future. The knowledge acquired, understanding and experience, logical abstraction and analytical qualities, feelings, personal values and norms are moulded into a whole, such that the parts are coordinated and are accepted for their full value. Almost all the respondents, each in their own way, refer to the importance of this integrative capacity.

The question is: how was it acquired? Naturally, there must be some "genetic baggage". Over and above this, experience is gained by operating at various places and under different circumstances. All the interviewees considered this a necessary prerequisite, though certainly not sufficient on its own. Training, study and education are also indispensable. But that still is not enough. Some of the most senior top-level managers emphasised a wide interest going far beyond the limits of what is specific to one's own company. Modern philosophy is one of the examples listed here. Last but certainly by no means least, some mental maturity is deemed necessary. Some respondents associated this with a particular phase in life, which roughly comes at the age after 40-45.



What does this mean for the selection of officers?

Basically, selection must be focused primarily on knowledge of one's subject, interpersonal and communicative skills, as well as the capacity for improvisation. In so far as these cannot be directly investigated, one must confine oneself to identifying a capacity receptive to being trained in them. For senior positions in the organisation, one must be particularly alert to the presence of analytical ability. Such aspects as imagination, creativity and what is termed integrative capacity, must be the deciding factor with candidates at the highest level. The selection must also take account of the candidate's phase in life. There is little point in investigating someone's qualities when his phase of development suggests he is not yet ready. As, however, this development does not proceed in the same way for all people, there is the possibility that some will be later than others in reaching it and even overtake the others at some future date. There are, however, people who never acquire integrative capacities, however excellent their analytical qualities. Continuous monitoring of candidates around the age of 40 will therefore be necessary. There is little point in early selection. The only thing that can give an indication at a younger age is a very wide interest and participation in society.



## Research and Theory on the Motivation to Lead: Implications for Officer Selection

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### Summary:

An original theoretical framework for understanding the relationship between individual differences and leadership behavior is described in which a new construct called the Motivation to Lead (MTL) is proposed. A study to develop measures and models for understanding this new construct is then reported. The findings are discussed in terms of their implications for officer selection in the military.

### Background

The applied and field research described in this paper is driven by substantive and theoretical concerns related to the process of leadership, leader development, leader selection and training.

Substantively, the roots of this research can be traced to a problem faced by the Singapore military in selecting and training its recruits to become leaders of men. Like several other countries in the world (e.g., Sweden, Taiwan, Israel), Singapore adopts a system of compulsory military service where all male youth have to enlist for military service at the age of 18. Given that military service is compulsory, an interesting problem arises in that the motivation of the soldiers to lead becomes a central issue in the selection and training of junior leaders in the military. The organization has long sought answers to fundamental questions such as "Can we select-for and measure the motivation to lead?" "Can the motivation to lead be changed, for example through training?" and "Does the motivation to lead affect leadership performance?"

Theoretically, it seems that the study of *individual differences and leadership* lacks a good theoretical framework. For example, it remains ambiguous as to *how* personality is related to leadership effectiveness. One possibility is to treat personality variables as substitutes for motivation that interact with cognitive ability to affect leadership performance. Alternatively, the social information processing approach to leadership suggests that personality is possibly relevant in terms of the fit of the leader's characteristics to the cultural expectation their ideal leader.

In a review of the literature, Lord and Hall (1992) called for a reconsideration of the importance of individual differences in explaining leadership behavior. They emphasized that more research was needed that took a multivariate approach to the study of leadership. They also emphasized the need to differentiate among different leadership criteria such as leader perception, leader

emergence, and leadership effectiveness. Clearly, a general theory that integrates the process of leader development with leader performance, and one that is multivariate in approach (i.e., differentiating among different predictors and behavioral criteria of leadership) is needed.

### Proposed theory

In a recent dissertation, Chan (1999) proposed a theoretical framework for understanding the role of individual differences in the study of leadership behaviors (see Figure 1). A key assumption of the theory is that various non-cognitive ability constructs such as personality and values relate to leader behaviors through the individual's MTL, which in turn affects the individual's participation in leadership roles and activities. It is through such activities that the individual acquires the social skills and knowledge required for leadership (cf. Lord & Hall, 1992, and Zaccaro, Gilbert, Thor and Mumford, 1991). Depending on the situation, these social abilities, together with the individual's general cognitive ability, represent the two potential *resources* (cf. Fiedler & Garcia's, 1987, cognitive resource theory) through which individual differences may interact with situations to affect leadership outcomes.

### Proposed MTL Construct

Chan (1999) broadly defined MTL as an area of study of those factors or processes that affect a leader's or leader-to-be's decisions in relation to the assumption of leadership training, roles and responsibilities, his or her intensity of effort at leading, and persistence as a leader of a group. He argued that the factors that affect each of these behavioral criteria include both individual differences as well as situational variables. However, his research focussed at understanding individual differences factors affecting MTL.

Given a lack of prior attempts to conceptualize the structure of MTL, Chan (1999) proposed that MTL may be conceptualized and measured in terms of three correlated factors, namely, Affective/Identity MTL, Non-calculative MTL, and Social-normative MTL. This three-factor model was derived by analogy from Meyer and Allen's (1992) three-component model of organizational commitment that shares conceptual

similarities with two major theories of social behavior (i.e., Fishbein and Ajzen, 1980, and Triandis, 1980).

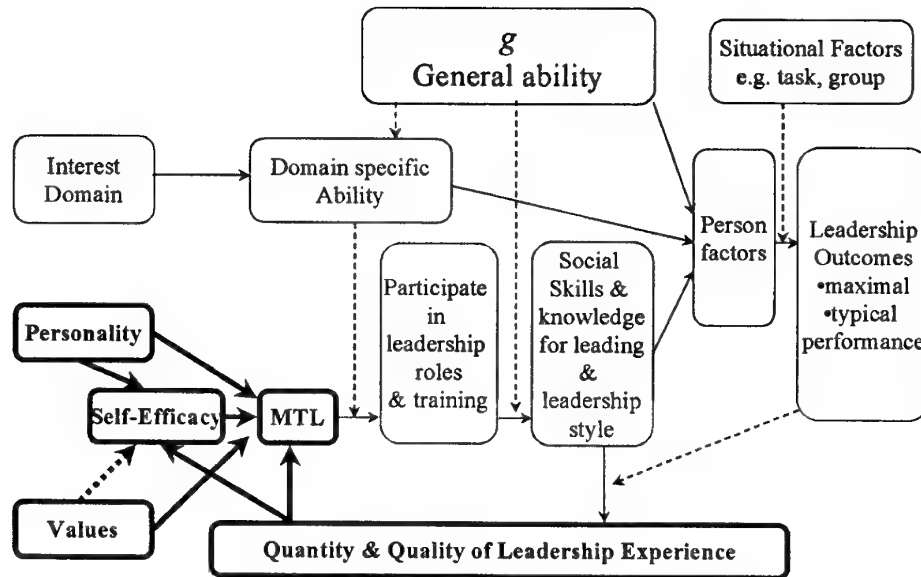


Figure 1. A theoretical framework for understanding individual differences and leader behaviors.  
(Areas in bold were tested in the research effort)

### Research Design

The goals of Chan's (1999) research were to conceptualize and measure individual differences in MTL, and to test a model of those factors affecting individual differences in MTL (see bolded elements in Figure 1). To accomplish these goals, a combination of cross-sectional, longitudinal and cross-cultural surveys was performed. Specifically, a cross-cultural, cross-sectional study was conducted to evaluate the model of antecedents to MTL. Past cross-cultural research (e.g. Hofstede, 1980; Schwartz, 1992) showed that Singapore society is generally collectivist, while U.S. society is highly individualistic. The use of (male and female) students in both countries allowed for a cross-cultural test of the model of factors affecting MTL in generally similar occupational contexts. A 3-month longitudinal within-culture study was also conducted in the Singapore military (male recruits only) to examine the relationship between MTL and various behavioral measures of leadership potential. The criteria were chosen such that there would not be any common-method or common-source variance with measures of MTL and various antecedents. The use of multiple-samples in different work and cultural contexts allowed for determining the external validity of the model of antecedents to MTL, and the structure of the MTL construct.

### Analyses

After conducting three pilot studies to develop the measures, exploratory factor analyses of self-report measures of MTL with data from the three samples (i.e.,

1594 Singapore military recruits, 274 Singapore Junior College students, and 293 American College students) indicated three different bases for leading, namely, affective/identity, non-calculative, and social MTL. The factors were positively correlated, indicating a second-order, General MTL factor. Confirmatory factor analyses across the three samples showed that the three-factor model fit the data better than a single-factor model. Multi-sample confirmatory analyses showed that the three-factor model was generally invariant across the three samples.

Next, a model of the antecedents of MTL (see Figure 2) which was derived from the theoretical framework in Figure 1 (see areas in bold) was tested. Using a data-driven, hierarchical regression modeling approach, consistencies in the patterns of antecedents to each of the three MTL factors were observed that were reasonable and theoretically justifiable.

A revised, parsimonious model (see Figure 3) was then developed from the findings of the regression analyses, and tested in a cross-validation-type effort using confirmatory factor analyses. Confirmatory modeling showed that the revised model not only fitted the data well, but was also more parsimonious relative to a general model with all possible paths from distal antecedents to MTL. Leadership self-efficacy and past experience were also found to mediate the relationship between various distal antecedents and the MTL factors. Cross-validation showed that the empirically derived model did not capitalize on chance (see Figure 3 for path estimates for one half of Singapore military sample).

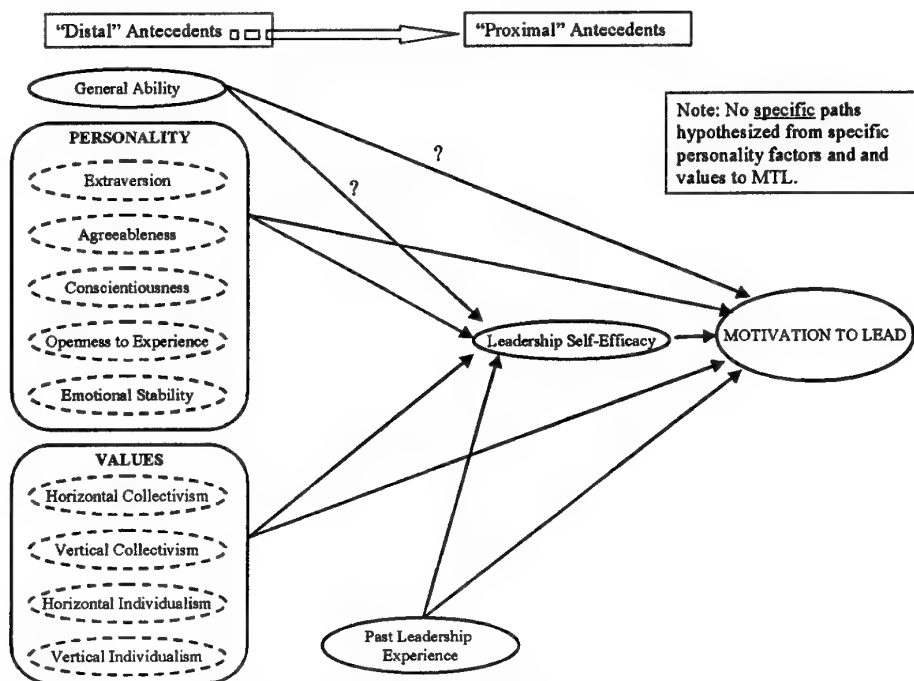


Figure 2. A general model of antecedents to the Motivation to Lead.

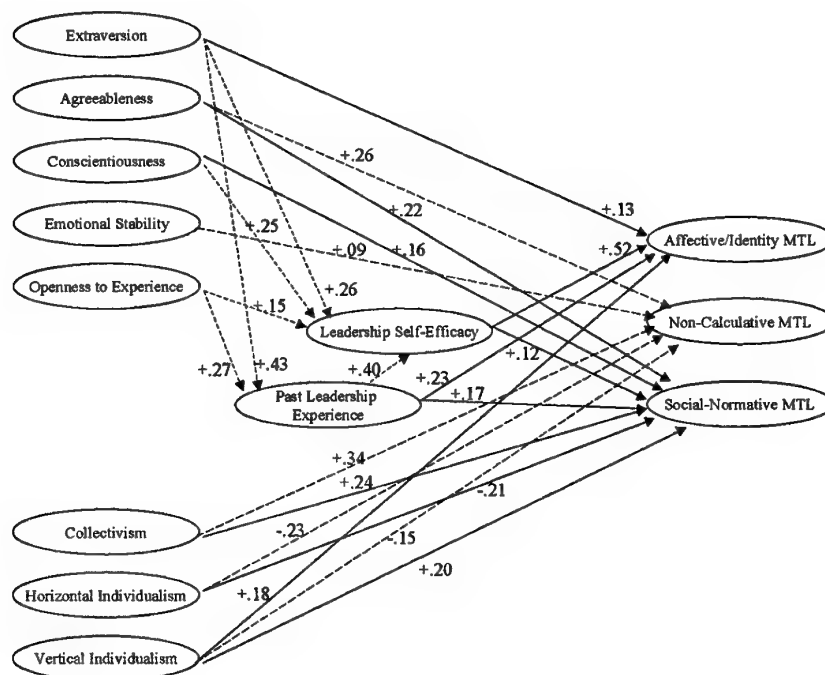


Figure 3. Revised, parsimonious model of antecedents to three Motivation to Lead Factors (path estimates from model fitted to one half of Singapore military sample,  $N = 792$ ; all except two paths significant at  $p < 0.01$  level).

Finally, the value of the MTL construct was demonstrated in relation to the prediction of two different multi-observer behavioral criteria in a three-month longitudinal study in the Singapore military. These included a three-day assessment center exercise, and a peer rating exercise conducted at the end of recruit training. Both aimed at determining leadership potential. A predictive validity study of the MTL measure showed that MTL was not only highly related to the two criteria, it also provided large incremental validity over other predictors such as general cognitive ability, values, personality and attitudes.

### Summary of Results

Several conclusions can be reached from Chan's (1999) research effort. First, MTL can be conceptualized and measured in terms of three correlated factors, namely, Affective/Identity MTL, Non-Calculative MTL and Social-Normative MTL. Second, personality, socio-cultural values, leadership self-efficacy and past leadership experience are the main antecedents to MTL, while general ability is unrelated to MTL. Third, each of the three MTL factors has their own unique set of antecedents (see Figure 3) that is generally consistent across three samples representing different occupational and cultural contexts and gender groups. This provides construct and external validity to the three-factor model of MTL. Fourth, there exist both direct and indirect paths (through leadership self-efficacy) from distal antecedents to MTL. Fifth, the self-report measures of MTL are related to behavioral measures of leadership potential.

Overall, the parsimonious model of antecedents to Affective/Identity MTL in Figure 3 says that people who like to lead, and who see themselves as having leadership qualities tend to be outgoing and sociable in nature (i.e., are extraverts), value competition and achievement (i.e., are vertical collectivists), have more past leadership experience than their peers, and are confident in their own leadership abilities (i.e., high self-efficacy). Socio-cultural values seem to play a relatively more important role among individuals high in Non-calculative MTL. Collectivistic values are consistently positively related, while individualistic values are negatively related to Non-calculative MTL. Agreeableness and emotional stability are also fairly consistently and significantly related to Non-calculative MTL, while leadership self-efficacy and past experience are not. Individuals high in Social-normative MTL are motivated by a sense of social duty and obligation, and are also accepting of social hierarchies but rejecting of social equality. They also tend to have more past leadership experience and confidence in their leadership abilities.

### General Implications of Results

*Theoretical significance.* Although the present study can be narrowly construed as a construct validation effort, it can also be seen as an initial test of a subset of the broader theoretical framework for leadership described in Figure 1. From this perspective, the study has demonstrated that personality, values and past

leadership experience affect MTL both directly and indirectly through leadership self-efficacy, and, that MTL is related to behavioral criteria indicative of the "participation in leadership training and activities" construct. The finding that general ability is unrelated to MTL also provides some support for the distinction between cognitive versus social ability as two different components of the "personal resources" of the leader in Figure 1.

Although existing theories of leadership (e.g., Bass, 1985; Fielder, 1967; Fiedler & Garcia, 1987; House, 1977; Vroom & Yetton, 1973) focus exclusively at predicting the leadership *performance*, Chan's (1999) theoretical framework presented in Figure 1 integrates two different aspects of leader behavior, namely – the leader *development* process and the leader *performance* process. Moreover, the MTL construct as developed and tested in this study is central to the theory of leadership development presented in Figure 1. Hence, the study can be seen as a partial effort at gathering empirical support for the theory of leadership development that forms one half of the theoretical framework presented in Figure 1.

*Practical significance.* The research on MTL together with the broad theoretical framework of individual differences leadership in Figure 1 present many practical implications for leadership selection, training and development in organizations. The empirical results show that MTL (and its antecedents) assessed at the point of organizational entry is at least predictive of subsequent behavioral ratings of leadership potential. This finding, interpreted in context of the broader theoretical framework in Figure 1, suggests that leadership selection systems should not only try to predict ultimate criteria such as leader performance (which are dependent on many other factors as shown in Figure 1), but should instead try to predict intermediate criteria measured during or at the end of leadership training. Moreover, one can also expect MTL (and its antecedents such as personality, values) to better predict non-task-performance behaviors such as coping and withdrawal behaviors and/or contextual performance behaviors (cf. Borman & Motowidlo, 1993) in such leadership training and development contexts. Future studies should examine non-task-related criteria in order to evaluate the MTL construct.

The finding that leadership self-efficacy and experience are related to MTL also suggests that MTL is not only affected by stable traits like personality, that MTL is a dynamic construct that is partially changeable through social learning processes and experience. This finding is especially useful to large organizations like the military in terms of the design of their leadership development programs. For example, the theoretical framework in Figure 1 suggests that leadership development efforts should (1) provide opportunities for participation in leadership roles; (2) "translate" participation in leadership roles into social skills and knowledge for leading and an acquired leadership style; (3) build leadership self-efficacy from leadership experience.

At a societal level, the empirical results also suggest that leadership development can and should take place

from an early age in school – that leadership training should be designed to enhance the self-efficacy and the trainees' leadership experience and skills.

**Cross-cultural.** Though including only two nations, Chan's (1999) study tried to present a new perspective to the study of leadership across cultures, i.e. that leader motivation may differ according to differing socio-cultural values. While the individualism-collectivism measure lacked the statistical power to account for cross-national differences in the MTL factors, the finding that leadership self-efficacy was significantly different across cultures, and that it explained the differences in MTL in the U.S. and Singapore, is consonant with cross-cultural theory that the "self" takes on different meanings in different cultures (e.g., Markus & Kitayama 1994). The theoretical framework proposed for individual differences and leadership also presented a possible explanation for how socialization practices affect MTL in different cultures. Further research employing more representative national samples is required to test this proposition.

**Situational MTL.** As highlighted earlier, MTL can be construed as a broad area of study of both personal and *situational* factors that affect a person's decision to lead, and his or her intensity and persistence while leading. Social psychologists refer to situations in which two or more parties must choose between self versus collective interests as social dilemmas (Pruitt, 1998). At the group, organizational or societal level, one can construe leadership as a potential social dilemma. If the benefits associated with leading are very high, too many people may want to lead resulting in a competitive environment and one with too few followers or "doers" that may eventually be detrimental to the group. If the costs of leading are high relative to the benefits, people may not want to lead and this could also be detrimental to the group in the long run. Hence, research on the situational factors affecting MTL may have important socio-political implications for the future generation of leaders, especially with increasing demands being placed on public leaders for accountability and the loss of privacy experienced by many public figures.

### Implications for Officer Selection

*Is MTL a useful predictor of officer performance?* This is perhaps the most fundamental question in any evaluation of predictors for officer selection. Empirically, we do not yet have data to show that MTL predicts officer performance "on the job". On the other hand, the theoretical framework presented in Figure 1 suggests that the answer to this question is not a simple one. This is because the theory in Figure 1 argues that MTL is only *indirectly* related to leadership performance, and most *directly* predictive of participation in leadership roles and training. The latter affects the acquisition of social skills and knowledge for leading and a leadership style, that in turn represents but one component of the personal resources that a leader brings to a situation to affect leadership outcomes.

Hence, it may be safe to suggest at this point that MTL may be a more useful predictor of participation, performance and adaptation/withdrawal behaviors during

leadership training, but not necessarily a good predictor of ultimate (often group-, role-, and situation-specific) leadership performance criteria. More empirical research is however needed to test these hypotheses.

*Can the MTL measures be used for officer selection?* The self-report measures of MTL developed in Chan's (1999) study were administered in a research context. It is widely known that job applicants can and do fake their responses in a selection context. Hence, it may be premature use the self-report MTL measures for officer selection. On the other hand, the research in this paper shows that assessment center and peer appraisal measures of leadership potential do measure aspects of MTL. Unlike self-reports, assessment centers and peer ratings are less subject to faking. Hence, we recommend the use of these techniques for measuring MTL in a selection context.

### Conclusion

Overall, a new approach to the study of leadership has been presented. It includes a multivariate approach to the study of leadership and integrates the process of leader development with that of leadership performance. Such a theoretical integration is useful for large organizations like the military that have to select their leaders, train them, and evaluate their performance. The theory is also radical in that it has brought together constructs from diverse domains of psychological theory to explain the relationship between general individual differences constructs and behavior. It suggests that individual differences constructs are indirectly related to leader performance, that non-cognitive constructs such as personality and values may be linked to leadership performance through the *process* of leadership development. Further research will be needed to test the many general propositions in the theory.

### References

- Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.
- Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt, W. C. Borman & Associates (Eds.), *Personnel selection in organizations*. San Francisco, CA: Jossey-Bass.
- Chan, K. (1999). *Toward a Theory of Individual Differences and Leadership: Understanding the Motivation to Lead*. Unpublished doctoral dissertation. University of Illinois at Urbana-Champaign.
- Fiedler, F. E. (1967). *A theory of leadership effectiveness*. McGraw-Hill: New York.
- Fiedler, F. E., & Garcia, J. E. (1987). *New approaches to effective leadership: Cognitive resources and organizational performance*. New York: Wiley.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior*. Don Mills, Ontario, Canada: Addison-Wesley.
- Hofstede, G. (1980). *Culture's consequences*. Newbury Park, CA: Sage.

Lord, R. G., & Hall, R. J. (1992). Contemporary views of leadership and individual differences. *Leadership Quarterly*, 3, 137-157.

Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion and motivation. *Psychological Review*, 98, 224-253.

Meyer, J. P. & Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Human Resources Management Review*, 1, 61-89.

Pruitt, D. G. (1998). Social conflict. In D. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4<sup>th</sup> ed.). New York: McGraw Hill.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 1-66). New York: Academic Press.

Triandis, H. C. (1980). Value, attitudes and interpersonal behavior. In M. M. Page (Ed.), *Nebraska Symposium on Motivation, beliefs, attitudes and values* (Vol. 1, pp. 195-259). Lincoln, NE: University of Nebraska.

Vroom, V. H., & Yetton, P. W. (1973). *Leadership and decision-making*. Pittsburg: University of Pittsburg Press.

Zaccaro, S. J., Gilbert, K. K., Thor, K. K., & Mumford, M. D., (1991). Leadership and social intelligence: Linking social perceptiveness and behavioral flexibility to leader effectiveness. *Leadership Quarterly*, 2, 317-342

## The Structured Interview

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### Summary

"Employee selection is usually a lottery, and interviews are not the best forum for checking the right person". This is a recent claim by a United Kingdom firm of recruitment consultants which advocates its own assessment centre as the way ahead for graduate recruitment.

Research by another recruitment group, Robert Half International, indicates that it takes only a matter of minutes for the interviewer to decide whether the body on the other side of the desk is the right person for the job. This research indicated that more than 20% of managers who were interviewed claimed that they could make up their minds about a candidate within one to five minutes. A further 45% believed that they were able to sum up a person's suitability in under 15 minutes. If these figures are correct, then clearly the way the candidate walks, dresses and how the body language shapes up for the first handshake, can all have a major effect on deciding which way a career and life-changing interview may go. Headhunters and executive search specialists all report that, however well-intentioned, objective and scientific the interview system, there are certain prejudices which can never be eradicated. For instance, for most there is a natural preference for working with good-looking people. Significantly, it is no coincidence that there are disproportionately few good-looking people doing menial jobs.

It is current fashion therefore to discredit the interview as a means of selection. However, the Royal Air Force uses a structured interview as an initial assessment procedure and also as a useful filter for candidates seen as less able. Following interview, candidates are graded on a scale of one (lowest) to 7 (highest). Statistical analysis of successful officer candidates shows a persuasive correlation between interview grades and the quality of success during officer training. The Royal Air Force is of the firm opinion that the structured interview remains a successful yardstick and tool during officer selection. How is this so?

1. First and foremost, the interviewers, who always have a wealth of general military experience, are formally trained interviewers. The Interview Board consists of 2 senior officers.
2. Secondly, the interview is specifically structured and tailored to elicit an accurate picture of the candidate, *vis-à-vis* his/her suitability for officer training.
3. Following the interview, where there is a difference of opinion, the differences are discussed and a compromise agreement is reached. Where there is no compromise (and this is rare) differences are recorded and then independently reviewed.
4. The Interview Boards are subjected to regular standardization checks by an independent board of assessors.

Experience has shown that the structured interview carried out by 2 formally trained officers, has a high degree of objectivity. The interview lasts for 45 minutes and all of that time is essential, plus later discussion between Board Members, to formulate an overall opinion and assessment.

Within the Royal Air Force Officer and Aircrew Selection Centre, the structured interview remains an integral and accurate method of assessment.

### The Structured Interview

What is meant by a structured interview? Simply, it is that the interview is designed around a *format*. This format enables the interviewers to extract all relevant information from the candidate and, at the same time, identify many of the useful *skills, qualities and traits* which are considered either to be essential or desirable in a



potential officer. At the same time, the structure of the interview can also highlight weaknesses which would reduce the candidate's trainability and potential.

It must be emphasized that the "structure" is not a simple list of questions which the interviewers adhere to. Indeed, there is no list. The structure enables free-flow dialogue between interviewer and interviewee and, as the interview progresses, the qualities good or bad are noted as they materialize. Furthermore, preparation for any interview is vital. It is possible to prepare a great deal from the candidate's dossier. The candidate's dossier, which has been prepared by support staff over many weeks prior to the interview, should include the following:

1. The candidate's *curriculum vitae*.
2. References obtained from employers/colleges/ schools.
3. Personal references (usually of limited value).
4. Medical record/history.
5. The candidate's application form.
6. Academic qualifications (checked and certified).

The application form itself is a particularly useful tool to set the scene. It should include:

1. Date and place of birth (verified).
2. Academic History - Basic qualifications/  
involvement/sporting  
interests at school and college  
- Further Education at college/  
university plus involvement  
- Part-time Study
3. Employment Record.
4. Civil/police prosecutions.
5. Sporting involvement, hobbies and interests.

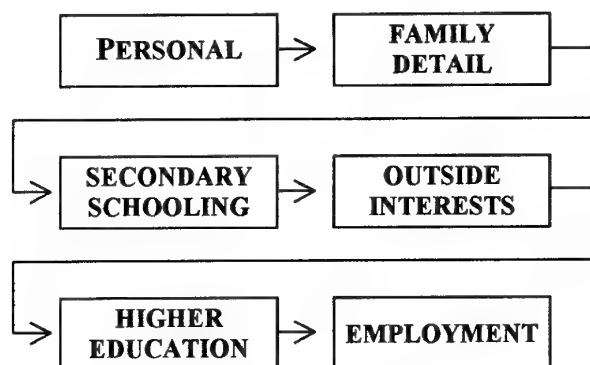
Record of significant detail has to be extracted and recorded on a set of easy-to-use Interview Forms. Further recording is then made on these forms as the interview progresses in order to complete the picture.

To be effective, the Interview Board *must* consist of 2 officers. The flow, even rapport with the interview would be lost by pregnant pauses if the interviewer had to slow to take notes. Thus, within any structured interview, one colleague talks whilst the other one takes notes. The Royal Air Force has found that this technique works very well although, in order to get a balanced opinion and feel for the candidate, the Boarding Officers change roles half-way through the interview. The note-taker becomes the interviewer and *vice versa*.

The basic structure of the interview is as follows in more detail.

1. One officer collects the candidate from the reception area and escorts him/her to the interview room. Whilst it is easy to form a first impression during this short phase, this has to be avoided, save for an objective perusal of the candidate's attire, bearing and general demeanour.
2. The candidate is settled into the interview after introducing the second colleague. The structured part of the interview can then begin and a simple, discreetly concealed, card is used as a reminder of the interview design and questioning progression. The interview follows this broad format:



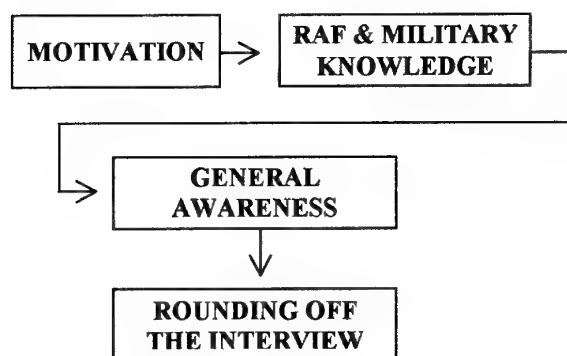


3. At Annex A is a typical card. Within it there are many headings in order to prompt questions. The candidate's answers are added, where necessary, to embellish the Interview Forms.

Whilst the interviewer and the candidate are locked into the questions and answers elicited from the structure as detailed on the card, the other colleague records the extra detail, adding meat to the information which was gained during pre-interview preparation. *However*, and this is the *vital* part of the whole process, a record is also made by the non-interviewer of *impressions* and a separate list of *qualities*, *skills* and *observations* is made. The form is simple. At Annex B is an example.

The form is very easy to use. It is a simple matter of recording the 'qualities' noted, good or bad, on the form. In order to give some sort of weight also to the 9 separate headings, each block is given a score on the right of the form. In this instance, a score of 1 is regarded as '*very poor*', whereas 9 is '*exceptional*'. Generally, 5, which is in the middle, is regarded as satisfactory. Clearly, the more qualities that are recorded in the left hand 'plus' column, then the higher the score. As an example, 2 plus 'qualities' and 2 negative 'qualities' will probably justify a score of 5, that is, a satisfactory overall balance. On the left-hand side of the form are some useful words which act as a reminder. The interviewers are not bound by the words, however, and can use other descriptions when and as appropriate.

Half-way through the interview (usually after about 25 minutes) the Board will have formed a pen picture of the candidate. The interviewers then change. The paperwork is passed over, and the second interviewer then looks more closely at the applicant's **Motivation**, **RAF Knowledge** and **General Awareness**. This second part usually takes about 20 minutes and, as before, there is no specific list of questions. Although it usually follows this format:



Again, a reminder card gives headings and guides in order to develop the questions. At Annex C is an example.

Whilst the second interviewer is questioning, the first interviewer continues to record on the sheet *qualities* and *any additional comment*. In addition, he checks and confirms (or even notes disagreements) the qualities noted in the first part of the interview. He will also add his own impressions. This double-check goes a great way to removing individual subjectivity. There are also 3 other boxes on the recording sheet which the recorder

completes during the second part of the interview. He will also 'score' these 3 boxes, recording his observations on the candidate's *Awareness, Motivation and Overall Impact*.

The interview is completed by asking the candidate what other applications for employment he might have generated and also what would his intentions be if unsuccessful with this application. He/she is then given the opportunity to ask questions of the Board, but this is limited by the caveat "within the context of the interview".

So, the interview is then complete. It must again be emphasized that there is no specific list of questions. However, it is worth mentioning, at this point, a simple questioning technique. Wherever possible, *indirect* questions are used; that is, each question starting with words such as *when* (dates), *where?* *who?* *why?* *how long?* *how often?* This ensures that the candidate cannot respond with the simple answer Yes or No. After all, one of the objects of the interview is to get the candidate talking.

When the candidate has left, the Board Members discuss the qualities recorded. It is surprising how close the opinion is in the vast majority of occasions. Where differences cannot be resolved, record is made, although the senior Board Member's overall score is naturally final. Almost always, discussion between the colleagues resolves the differing opinions.

So, now there is a completed scoring sheet. It is then possible to come up with a **Board Grade**. An equal balance of strengths and weaknesses would lead to a satisfactory grade (or 'score'). More positive qualities would increase the Board Grade. In the Royal Air Force system, a Board Grade of 1 is 'very poor', increasing score only up to a maximum Board Grade of 7 (ie 'exceptional'). Incidentally, the final Board Grade of 7 is on a different scale to the 1 to 9 seen on the scoring sheet.

There are definitions to help us define the Final Board Grade. At Annex D is a completed form which is an example of a very high Board Grade. It can be seen that there is a preponderance of positive scores on the left.

Conversely, at Annex E is an example of a very weak candidate who would not be acceptable. Note that there is a preponderance of weaknesses listed on the right-hand side.

#### Verification of the Royal Air Force Interview Procedure

Candidates can be tracked through to and beyond Initial Officer Training as the Department of Initial Officer Training is located on the same base as the Officer and Aircrew Selection Centre at the Royal Air Force College Cranwell. In order to demonstrate the validity to the Structured Interview, the Board Grades of consequential Officer Cadet Prize Winners over a period of 18 months are included at Annex F. This indicates quite substantial accuracy of the Structured Interview in identifying *potential*.

It can be seen that the percentage of Board Grades 5 and 6 is very small, yet there is a significant preponderance of higher Board Grades amongst the Prize Winners. The Royal Air Force remains confident that their interview system, using a Structured Interview, is not only **objective** but is also **accurate** and **effective** in predicting not just *success* in Initial Officer Training, but also *quality*.

To conclude then, in the RAF's selection procedure, the interview is only the first stage. It acts as a useful filter to weed out the poor candidates – perhaps about 25% of applicants invited for interview. The remainder of the candidates then proceed to the next stage of the selection procedure, where they are grouped in syndicates of 5 or 6 to expose them to a selection of group exercises. Their performance is again monitored and scored and this second score, together with the performance seen at interview, is used to make the final selection. Overall validation of the system can be gauged by a very low, eventual failure rate during Initial Officer Training.

# The Interview Card - Part 1

WHEN (DATES)?	WHERE?	WHO?	WHAT?	WHY?	HOW LONG?	HOW OFTEN?
<b>PERSONAL</b> WHEN BORN HOW OLD WHERE BORN WHERE LIVING NOW HOW LONG WHERE ELSE LIVED	<b>FAMILY</b> HOW MANY/CONSIST OF POSITION FATHER DO/MOTHER DO HOW DESCRIBE HOME LIFE VIEW MARRIAGE/PLANS FAMILY SERVICE LINKS			<b>SCHOOLS</b> NO PRIMARY/NO SECONDARY NAME(S)/TYPE SECONDARY TRANSFER DATES (SECONDARY) SIZE B/G MIX DISTANCE HOME/TRAVEL		
<b>INSIDE SCHOOL</b> (Group together if 2+) EXAMS AVAILABLE WHICH TYPES TAKEN DATE/NO/NO PASSED A+EQUIV SUBJECTS GRADES HOW FEEL/HOW HARD HOW STUDENTS HELP SPORTS CLUBS/SOCIETIES UNIFORMED/CCF ADV TRG DofE OTHER ACTIVITIES TRAVEL (GAPS)	<b>OUTSIDE INTERESTS</b> (During School days) SPORTS YOUTH ORGS: ATC-SCOUTS- BB-GG-Y/CLUB HOBBIES/INTERESTS OTHER ACTIVITIES HOW FINANCED/PT JOBS SCHOOL HOLIDAYS TRAVEL AMBITIONS/CAREER ADVICE (GAPS)			<b>HIGHER EDUCATION</b> WHERE/REASON FOR CHOICE COURSE/TYPE/DATES ACADEMICS HOW FEEL/HOW HARD HOW LIVE/GRANT HOW MANAGE FINANCIALLY LOANS/OVERDRAFTS UNIVERSITY/COLL LIFE SPORTS SOCIETIES/UAS/OTC STAs VACATIONS/JOB/STUDY (GAPS)		
<b>DRUGS</b>	<b>SEEN/INVOLVEMENT/VIEWS</b>	<b>MANDATORY</b>			<b>1. POLICE 2. OTHER PROSEC</b>	<b>DATE/COURT/OFFENCE/RESULT</b>
	<b>SERVICE DISCIPLINE</b>	<b>(SEE CARD)</b>	<b>GAPS</b>	<b>HIGH/LOW</b>		

ANNEX B

## The Interview Scoring Sheet

### Impressions - Qualities - Skills - Observations

<b>APPEARANCE AND BEARING</b> Build, Bearing, Dress, Grooming	+	-	9 8 7 6 5 4 3 2 1
<b>MANNER</b> Confidence, Composure, Poise, Polish, Alertness, Sense of occasion, Humour, Courtesy	+	-	9 8 7 6 5 4 3 2 1
<b>SPEECH AND POWER OF EXPRESSION</b> Vocabulary, Fluency, Diction, Lucidity, Logic, Conviction, Persuasiveness, Projection, Animation, Effectiveness	+	-	9 8 7 6 5 4 3 2 1
<b>ACTIVITIES/INTERESTS</b> Range/Type, Sense of purpose, Adventure, responsibility, Involvement, tenacity, Dedication, Determination, Initiative, Independence, Enterprise, Social awareness, Commitment, Cultural balance, Compatibility	+	-	9 8 7 6 5 4 3 2 1
<b>ACADEMIC LEVEL/POTENTIAL</b> How well qualified for IOT/desired branch, Determination, Further potential, Ease of obtaining qualification, Attitude to studies	+	-	9 8 7 6 5 4 3 2 1
<b>PHYSICAL LEVEL/POTENTIAL</b> How well prepared physically for IOT, Fitness, Sporting Prowess, Ruggedness, Adventure, Endurance, Determination, Frequency of Exercise, Attitude to Fitness	+	-	9 8 7 6 5 4 3 2 1
<b>AWARENESS</b> Interests in / Awareness of military/current affairs. Maturity of views, Ability to reason, Originality of views, Relate to age	+	-	9 8 7 6 5 4 3 2 1
<b>MOTIVATION</b> Motives for RAF and chosen branch, how well substantiated, Sincerity, Preparation, Conviction, Enthusiasm	+	-	9 8 7 6 5 4 3 2 1
<b>OVERALL IMPACT</b> Force of personality, Presence, Assertiveness, Strength of impact, Reaction to pressure	+	-	9 8 7 6 5 4 3 2 1

## The Interview Card - Part 2

### MOTIVATION

WHY RAF	WHAT BRANCHES APPLIED FOR (CHECK ANY CHANGES)
WHAT ATTRactions	WHAT LENGTH COMMISSION
WHEN FIRST	WHAT OTHER BRANCHES
WHOM TALKED TO (CAREERS ADVICE)	NC0(AIR)
PREVIOUS VISITS - OASC	HOW IMPORTANT COMMISSION
WHAT PERSONAL CONTACT	WHAT QUALITIES REQUIRED
WITH RAF	P3 SERVICE (IF APPROPRIATE)
WHAT DISADVANTAGES	
WHAT FAMILY ETC THINK	

### SERVICE KNOWLEDGE

IO/AITC	SECONDARY DUTIES
BRANCH(ES)/NC0(AIR)	WHERE OVERSEAS
AIRCRAFT/ROLES	WHY OVERSEAS
<b>WARFARE ATTITUDE</b>	NATO

### GENERAL AWARENESS

HOW INTERESTED IN KEEPING UP TO DATE NEWSPAPERS/TV
SIGNIFICANT EVENTS PAST YEAR - OVERSEAS/HOME OWN VIEWS

### ROUNDING OFF

<b>INTENTIONS IF UNSUCCESSFUL</b>
OTHER APPLICATIONS
ANY QUESTIONS: BOARD MEMBER CANDIDATE



ANNEX D

APPEARANCE AND BEARING Build, Bearing, Dress, Grooming	+	Immaculate Impressive bearing Grooming	--	-	9 8 7 6 5 4 3 2 1
MANNER Confidence, Composure, Poise, Polish, Alertness, Sense of occasion, Humour, Courtesy	+	Confidence Polish Alertness Humour	--	-	9 8 7 6 5 4 3 2 1
SPEECH AND POWER OF EXPRESSION Vocabulary, Fluency, Diction, Lucidity, Logic, Conviction, Persuasiveness, Projection, Animation, Effectiveness	+	Fluency Effectiveness Animation Vocabulary	--	-	9 8 7 6 5 4 3 2 1
ACTIVITIES/INTERESTS Range/Type, Sense of purpose, Adventure, responsibility, Involvement, tenacity, Dedication, Determination, Initiative, Independence, Enterprise, Social awareness, Commitment, Cultural balance, Compatibility	+	Sense of purpose Involvement Commitment	Cultural balance Social awareness Enterprise	-	9 8 7 6 5 4 3 2 1
ACADEMIC LEVEL/POTENTIAL How well qualified for IOT/desired branch, Determination, Further potential, Ease of obtaining qualification, Attitude to studies	+	Exceptional <i>quals</i> Attitude to study Further potential	--	-	9 8 7 6 5 4 3 2 1
PHYSICAL LEVEL/POTENTIAL How well prepared physically for IOT, Fitness, Sporting Prowess, Ruggedness, Adventure, Endurance, Determination, Frequency of Exercise, Attitude to Fitness	+	Sporting prowess Frequency Attitude to fitness	--	-	9 8 7 6 5 4 3 2 1
AWARENESS Interests in / Awareness of military/current affairs. Maturity of views, Ability to reason, Originality of views, Relate to age	+	Intellectual argument Originality	Service knowledge Military awareness	-	9 8 7 6 5 4 3 2 1
MOTIVATION Motives for RAF and chosen branch, how well substantiated, Sincerity, Preparation, Conviction, Enthusiasm	+	Sincerity Enthusiasm	Substantiation Preparation	-	9 8 7 6 5 4 3 2 1
OVERALL IMPACT Force of personality, Presence, Assertiveness, Strength of impact, Reaction to pressure	+	Presence Force of personality Assertiveness Reaction to pressure	--	-	9 8 7 6 5 4 3 2 1

# ANNEX E

APPEARANCE AND BEARING Build, Bearing, Dress, Grooming	+	Strong build	- Untidy Slouched	9 8 7 6 5 4 3 2 1
MANNER Confidence, Composure, Poise, Polish, Alertness, Sense of occasion, Humour, Courtesy	+	Polite	- Confidence Unpolished Mild, colourless	9 8 7 6 5 4 3 2 1
SPEECH AND POWER OF EXPRESSION Vocabulary, Fluency, Diction, Lucidity, Logic, Conviction, Persuasiveness, Projection, Animation, Effectiveness	+	Projection	- Fluency Obtrusive accent Mumbled - pressure	9 8 7 6 5 4 3 2 1
ACTIVITIES/INTERESTS Range/Type, Sense of purpose, Adventure, responsibility, Involvement, tenacity, Dedication, Determination, Initiative, Independence, Enterprise, Social awareness, Commitment, Cultural balance, Compatibility	+	Enterprise	- Involvement Commitment Cultural balance Narrow in range (unstretched)	9 8 7 6 5 4 3 2 1
ACADEMIC LEVEL/POTENTIAL How well qualified for IOT/desired branch, Determination, Further potential, Ease of obtaining qualification, Attitude to studies	+	--	- Minimum quals Drip fed Further potential	9 8 7 6 5 4 3 2 1
PHYSICAL LEVEL/POTENTIAL How well prepared physically for IOT, Fitness, Sporting Prowess, Ruggedness, Adventure, Endurance, Determination, Frequency of Exercise, Attitude to Fitness	+	--	- Adventure Ruggedness Frequency of exercise	9 8 7 6 5 4 3 2 1
AWARENESS Interests in / Awareness of military/current affairs. Maturity of views, Ability to reason, Originality of views, Relate to age	+	Broad awareness	- Reasoning skills Limited intellect	9 8 7 6 5 4 3 2 1
MOTIVATION Motives for RAF and chosen branch, how well substantiated, Sincerity, Preparation, Conviction, Enthusiasm	+	Keen and sincere Substantiated Conviction	--	9 8 7 6 5 4 3 2 1
OVERALL IMPACT Force of personality, Presence, Assertiveness, Strength of impact, Reaction to pressure	+	A genuine man	- A 'mouse' No impact/presence Assertiveness	9 8 7 6 5 4 3 2 1

Board Grades of  
Recent Initial Officer Training Prize Winners  
(for leadership/officer qualities)

Interview Grades

6  
6  
6  
5  
5  
5  
5  
5  
5  
5  
4  
4  
4  
4  
4  
4  
4  
3  
3  
3  
18

INTERVIEW GRADE PERCENTAGES	
Grade	%
6	1.75
5	7.2
4	22

NB. From a sample of circa 3000 candidates





# Matching Selection Criteria And Ultimate Vocational Criteria For Officers In The Belgian Armed Forces

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**Summary:** Before 1990, the military context of employment was relatively uniform. Dramatic changes since then - a new vision on leadership, and the multiple vacancies for applicant officers - gave raise to the question if differentiation in selection criteria would not be more appropriate than the overall procedure in use, given the (hypothesized) differentiation in ultimate vocational criteria. This question falls apart into two questions: 1) which are those ultimate criteria? and 2) which of them apply to whom and to what extent?

In a first step, an inventory of criteria ought relevant was drawn, resulting in a list of 118 criteria. In a second step, factor analysis was used to regroup these criteria on the basis of common latent factors. Six factors were found; corresponding to the "Big Five" of personality and one military factor. In a third step, the relative importance of those criteria was assessed and, finally, discriminant analysis was used to distinguish between "kinds" of officers on the basis of those common factors. These "kinds" refer to three different aspects: the status, the studies done as applicant-officer, and the different Services, Specialties, Arms and Type of units.

## Introduction

The overall ultimate criterion that was used since a long time in the recruitment was: having the necessary aptitudes to do his job in difficult and stressful circumstances, i.e. leading a small group of people.

Intermediate criteria (in reversed order) were 1) the results at the end of the instruction period in the Arm Training Center (ATC) and, 2) at the end of the studies at the Royal Military Academy (RMA). In this sense, selection was intended to predict succes in that intermediate criterion.

Based on factor analytic research, that global criterion was operationalized at selection level in the evaluation of: 1) intelligence, 2) sense of responsibility, 3) self confidence, 4) social behavior in (small) groups and 5) motivation. The weigh of each factor has been determined by regression analysis and was the same for every applicant, irrespective of his category and position (e.g. career officer versus temporary officer or enlisted officer).

## The problem

Given that new categories of officers had been created and that the geopolitical situation had changed, leading to a new type of missions - i.e. peace support operations - some officers responsible for the selection of officer applicants were asking for a differential approach. Moreover, the general staff had decided to introduce a new concept of leadership that relied more on human relations. So, we wondered if it was not necessary to review the operationalization of the selection criteria taking into account a more specific definition of the ultimate vocational criterion and the fact that applicants were recruited in different populations for different career types. For example, according to Vervaeke (1992) predictive validity for ATC was .40 but the correlation with praxis in the unit was only .29. This means that different things are evaluated in both settings.

We will not enter here into the discussion of how to operationalize criteria on a conceptual level (single versus multiple criteria, traits versus behavior, etc).

Thus, the two problems at hand are:

1. What are relevant criteria in the evaluation of an officer?
2. Are there differences in criteria to be taken into account according to differences in the "typology" of officers? With respect to the latter, we considered differences in 1) status (career type), 2) studies done as applicant officer, and 3) type of Service/Specialty/Arm/subtype. Figure 1 shows the "taxonomy" of officers types existing in the Belgian Armed Forces.

## Problem 1: A need for new (selection) criteria?

The procedure we used to determine the ultimate succes factors was done in four steps as follows. First, we drew an inventory of all the selection criteria in use. Running through all the selection tests revealed 29 different specific criteria; for example, capability to organize, verbal memory, achievement motivation, technical insight, self confidence.

Second, we looked at the criteria used for the evaluation in the ATC, the RMA and in the bi-annual evaluation of officers in the units. In this second step, we identified 18 new criteria; for example, creativity, authority, loyalty, sense for public relations. Thus, taken together with the

selection criteria, we have 47 different criteria in total, which can be considered as "general applicable".

In a third step, we asked all staff sections of the Services involved in personnel management, and all the commanders of military schools and ATCs to send us a list of the criteria they thought important for the "kind" of officers they were responsible for. In order to avoid overlap we gave them the list with the 47 criteria already determined. We received an answer of 101 officers representing all services concerned with the problem at hand. Together, they are "responsible" for 71 new criteria. Thus, at the end we had 118 more or less different criteria in total. Contrary to what we expected, those new criteria were not so "Service specific" but reflect rather "trait-like" aspects. The most cited criteria were: disponibility, (intellectual) flexibility, caring for efficacy, pragmatism, care for material.

We considered this list of 118 items too long to be used as such. In other words, a systematic and objective grouping into classes is needed and/or a reduction by eliminating synonyms and very similar items as well. In this fourth step, we did the exercise first by ourselves using the categories that are often used in developmental psychology: 1) cognitive aspects, 2) physical and psycho-motor aspects, 3) psycho-social aspects, 4) emotional and dynamic-affective aspects, and 5) values and norms. A pilot study with the collaboration of 15 officers with different background did not lead to a significant reduction nor to a consistent reduction neither. Thus, we were forced to switch to a statistical approach; more specifically, factor analysis.

Therefore, we asked all 370 officer-students of the RMA to think of an officer they knew very well but who was not their best friend nor their enemy. Self assessment was also forbidden in order to avoid effects of social desirability. They had to judge on a 7-point scale to which extent each criterion applies to that particular person (0= is not applicable at all/does never show that behavior, 6= completely applicable/shows always that behavior). The data of the 257 respondents were analyzed with SPSS. Unfortunately, the correlation matrix between all criteria was "ill conditioned", meaning that relatively small changes in the data could lead to relatively strong changes in the solution. This means that further results, based on these data, have to be interpreted with caution.

The Kaiser-Meyer-Olkin index was .86; meaning that the correlation matrix is well suited for factor analysis. Bartlett's index of sphericity was 20910.34 ( $p < .000$ ); meaning that at least one common factor can be extracted from the data. A principal components analysis resulted in 30 factors with an eigen value greater than 1, explaining each from 22% to 1% of the variance and in total 71%. The scree-test indicated three possibilities: a solution with four, six or nine factors respectively. In each solution we considered

only those criteria with a factor loading of at least .30 (in other words, the factor explains at least 10% of variance of that item). The four-factor solution has been rejected because only 32% of the variance is explained by those factors and three of them were rather difficult to label.

The six factor solution explains 36% of the variance and was quite well interpretable. Five factors could be associated relatively well with the "big five" factors of personality. The sixth factor refers to typical military aspects. Conscientiousness is reflected in items that have to do with "*orientation towards the task*"; Agreeableness is associated with aspects of the "*ideal image of an officer*"; criteria that deal with "*orientation towards people*" are associated with Extraversion; the fourth factor regroups criteria of "*professional strength*" or Emotional Stability; aspects of *cognitive behavior* are clearly instances of Openness; finally the sixth and last factor is labeled as "*commitment*". Given that the nine factor solution has no substantial added value, we stick to the six factor solution. Figure 2 illustrates this factorial composition in terms of criteria.

#### **Problem 2: A need for differentiation according to vision of the "end user".**

This phase contains four steps. In step 1, we measured the relative importance of the 118 criteria by means of a questionnaire sent to several units of the Services and the State Police. In step 2, we checked the existence of groups of criteria associated with (groups of) "kinds" by means of hierarchical classes analysis. In step 3, we factor analyzed the answers stemming from respondents belonging to the units. And finally, in step 4, we used discriminant analysis to differentiate at best between "kinds" on the basis of the factors found in step 3.

In step 1, we sent the whole list of 118 criteria to a large sample of officers – i.e. about ten of every type and kind (cf. Figure 1 a, b and c); in total about 800 persons belonging to 45 different units were asked for their collaboration. Their task was to "score" on a 7 point scale (0= not important at all; 6= extremely important) each of those criteria using the critical incident method (Flanagan); i.e. to evaluate to which extent a given criterion is *critical* for the appropriate functioning of an officer of his "kind". We stressed the notion of "critical" to avoid answer patterns that reflect an idealistic view resulting in only high scores. By doing so, high scores correspond to important criteria and low scores to criteria "nice to have". We received about 240 answers that could be used for analysis. Although we received answers covering most of the kinds in our taxonomy, such a low response rate forces us to be cautious in interpreting the results.

The hierarchical classes analysis in step 2 did not lead to meaningful clusters of criteria that could be associated with meaningful clusters of "kinds". In fact, we found already a good fit between a rank 1 solution (i.e. one cluster of criteria associated with one cluster of kinds) and the data, namely .93. This seems to indicate that all

criteria are considered relevant to each kind of officers. Differences can then only be attributed to differences in the extent to which a given criterion or subset of criteria is critical.

That is the reason why we returned to factor analysis in step 3: to determine factors as common denominators for the criteria. Thereby we hoped to detect the same six clusters of criteria as under problem 1. In other words, the new factor analysis can be seen as a validation study of the solution found when studying problem 1. Now, we found 22 factors with an eigenvalue greater than one; explaining each from 36.7% to 0.8% of the variance and together 77.5% of the variance. All factor loadings were higher than .30 and most of them even higher than .40. Given that the scree-test was not indicative for a certain number of factors, we considered only the six factor solution. The majority of the items still belong to the same factor as in the solution of problem 1. Most of the criteria that shifted from one factor to another could be reinterpreted in the sense of the factor they load on. The major problem was the "dissipation" of the factor Commitment. We explain this in the following way: the first solution was based on the perception of students while the second solution on is based on the judgement of "real" officers. Because the latter gave quite the same scores to the items referring to "commitment" there is a lack of variation, so that no factor could be extracted. Thus, the prominent factors correspond still to the Big Five.

As already said, in step 4 we tried to discriminate at best between "kinds" on the basis of the criteria. Because discriminant analysis can only be performed with a few variables, we regrouped the criteria into more "compact" variables corresponding to the factors, just by summing the scores of the items loading high on a particular factor.

We verified the differentiation between "kinds" according to the three aforementioned aspects: status, type of studies, and the four levels Service/Specialty/Arm/subtype (cf. Figure 1.a, 1.b. and 1.c. respectively).

Each analysis was performed twice: once including directly all variables and once stepwise, including one by one only statistical significant variables.

The distinction between conscript officers and active officers relies on one discriminant function, in which Cognitive Abilities (.75), Orientation towards People (.70) and Professional Strength (-.70) are dominant. Active officers are predominantly characterized by the first two factors and the conscript officers rather by the third one (means on the discriminant function are .24 and -.67 respectively). This effect is shown in Figure 3.a.

The classification power of the discriminant function is not that high: only 63% of the "profiles" are correctly classified (which is 25% better than classifying by

chance). In the stepwise procedure, only the Cognitive factor enters into the equation; thus cognitive aptitudes are seen as much more important for active officers than for conscript officers.

No significant function was found for discriminating between career officers, complementary officers and temporary officers. Thus, the respondents did not make a clear cut distinction between those kinds of officers on any of the six factors.

As shown in Figure 1, we considered five different types of studies. We found one significant discriminant function. As can be expected, the differentiation is essentially based on the Cognitive factor (-1.49), and to a lesser extent on Orientation towards People(-.85). Group means are -.94 (Industrial Engineers), -.86 (Civil Engineers), -.75 (Medical), -.48 (Naval College) and .48 (All Arms). Thus, in the first four cases the Cognitive abilities are much more important (as compared to the other ones) whereas in All Arms the Orientation towards People is dominant (relatively spoken) as shown in Figure 3.b. The classification power of the discriminant function is 38% better than by chance, which means that the distinction between groups is not that clear cut. This is proven by the stepwise procedure, because four factors enter into the equation: Cognitive Abilities, Orientation towards People, Commitment and Ideal Image.

When we compare the four Services and the State Police, one discriminant equation suffices, which creates a bipolar dimension with at the one end Commitment (1.21) and at the other end Professional Strength (-1.59) and Orientation towards the Task (-.71). Groups means are -1.01 (Navy), -.13 (Army), .05 (Medical Service), .10 (Air Force) and .95 (State Police). Thus, Navy officers ought Professional Strength and Orientation towards the Task much more important than the other factors, while officers of the State Police think just the opposite. In the opinion of the Medical Service officers, the mentioned factors seem equally important, resulting in a nearby zero position. The same holds to a lesser extent for the Army and the Air Force. Figure 3.c shows the relative position of each service based on the group means. In the stepwise procedure, four factors enter into the equation, showing that there is no clear distinction between services, except for Navy and State Police.

Next we considered a first level of specialties within the Services (see Figure 1.c, column 2). Unfortunately, the technical personnel and services of the Navy are not represented, and the technical personnel the Air Force is only represented by two respondents. Two discriminant functions are significant (although the second one only at  $p < .10$ ). The first function contrasts Commitment (1.03) and Professional Strength (.62) with Orientation towards People(-.51) and Ideal Image (-.51) respectively. The second function opposes the combination of the Cognitive factor (.91) with Ideal image (.69) to a combination of Orientation towards People(-1.54) and towards the Task (-.54). The groups means on both dimensions are used as

coordinates in a bidimensional space (Figure 3.d). The first equation discriminates between entities of the Army especially on the first dimension; they are ordered from right to left according to their distance from the "contact line": combat troops – fire support – technical support – services. Moreover Cognitive Abilities are relatively more important in the fire support Arms than in the other ones. Differences in the Air Force are predominantly based on the second dimension: Flying Personnel is characterized by criteria that refer to the Cognitive factor and the Ideal image while Orientation towards People and to the Task is typical for Non Technical personnel; the position of Technical Personnel is nearer to the Flying Personnel than to the Non Technical Personnel. Although the differences are rather small, the less they are involved in "flying", the less is their Commitment/Professional Strength (and the more Ideal Image and Orientation towards People become important). In the Medical Service, both dimensions play a nearby equal important role, but the position of the Medical Corps is just the opposite of the Non Medical Officers. Given that there is only one kind of Naval Officers represented, it is not possible to speak in terms of between group contrast. The dominant characteristics in their profile are in the first place Ideal Image and Orientation towards People, and in the second place Cognitive Abilities. The stepwise procedure confirms the pattern we found in the direct approach. The classification power of the functions is weak, except for the Flying Personnel (84%) because several groups have a small number of representatives.

Discrimination at the level of the Arms of the Army is done on the basis of three significant functions. The first dimension contrasts Commitment (1.09) and Professional Strength (.75) with Orientation towards People (-.71). The second dimension opposes Orientation towards People (.88) and Cognitive Abilities (.77) to Orientation towards the Task (-1.29) while the poles of the third dimension are Orientation towards People (1.12) and towards the Task (1.08) versus Ideal image. The means of each group on the three dimensions is given in Figure 3.e. There is a striking difference between the Technical Evaluation Service at the one hand and all other Arms at the other hand based as reflected in the extreme position of the Evaluation Service on the first and second dimension. This configuration tends (again) to oppose the Combat Arms and Fire Support to the Technical Support Arms and Services, but the differences are rather small. The classification power of the discriminant functions is

also weak: only 26% better than by chance. All factors enter into the equations in the stepwise procedure; this confirms the pattern found by the direct procedure. Further, it shows that there are no clear differences in perception between Arms based on one of only a few dimensions.

Unfortunately, an analysis at the level of unit types has not been possible due to a lack of data.

### Conclusion

The analysis of the evaluation documents revealed that the selection criteria used are a subset of the criteria ought important by the "end users".

In their opinion, there exists something like an overall prototype officer which can be characterized in terms of the Big Five of personality or its "militarized" counterpart plus one particular vocational factor.

In most of the cases studied, it was possible to discriminate between kinds of officers for each of the three aspects – status, studies, Services and its subdivisions - but the differentiation was rather weak, resulting also in a weak classification power.

At this moment, the overall conclusion seems to be that there is no need to adapt the selection criteria as such, but the factors they are based on may be subject of a more fine grained study, especially because it is possible to situate them in a theoretical framework of personality and not only in an empirical, factor analytical one.

Neither seems it worth to introduce a differentiated approach in selection according to status, studies or specialty. With respect to the first aspect, due to the suspension of the conscript system, we have no longer conscript officers and the differentiation within the category of active officers was not significant at all. The evaluation of study based differences – which were predominantly characterized by Cognitive Abilities - is done by the academic entrance contest at the RMA. Notwithstanding the fact that the differences between specialties could be interpreted in a meaningful way, the differences are too small by now to be a valid argument for differentiation at the selection level. These conclusions do not mean that the study we undertook has been worthless. Its main advantage is to have disconfirmed in a scientific way some intuitive arguments in favor of differentiation and to have highlighted the ultimate vocational criteria as perceived by the "end user". Finally, given that the training at ATC level is by definition oriented towards a particular type of Arm or Specialty, it would be wise to do this study again at the level of the intermediate criteria.

**Figure 1.** Taxonomy of officer types**a. Based on status**

Status	Type
Active Officer	Career Officer
	Complement Officer
	Temporary Officer
Reserve Officer	

**b. Based on studies (Career Officers only)**

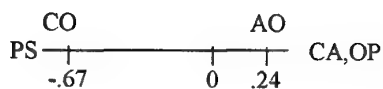
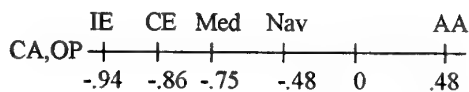
School	Division
RMA	All Weapons (Military & Social Sciences)
	Polytechnics (Civil Engineer)
Elsewhere	Industrial Engineer
	Medical (Physician, dentist, pharmacist)
	Nautical College

**c. Based on Service/Arm or Specialty**

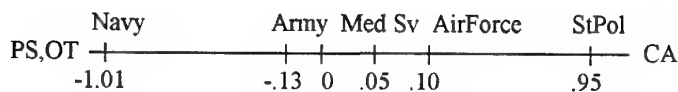
Service	Specialty	Arm	Subtype
Army	Combat	Infantry	Light Infantry
			Mechanized Infantry
			Paratroopers
	Fire support	Armored Troops	Reconnaissance Tank
		Artillery	Field Artillery
			Air Defence (Msl)
			Air Defence (Guns)
	Technical Support	Engineer	
		Military police	
Signal Troops			
Services	Logistics		
		Supply	
		Mechanics	
		Transport	
Air Force	Pilots & Navigators		
	Technical Services		
	Non Technical Services		
Navy	Bridge Officer		
	Technical Personnel		
	Non Technical Services		
Medical Service	Medical		
	Non Medical		
Gendarmerie (Federal Police)			

**Figure 2.** Criteria as instances of the Big Five

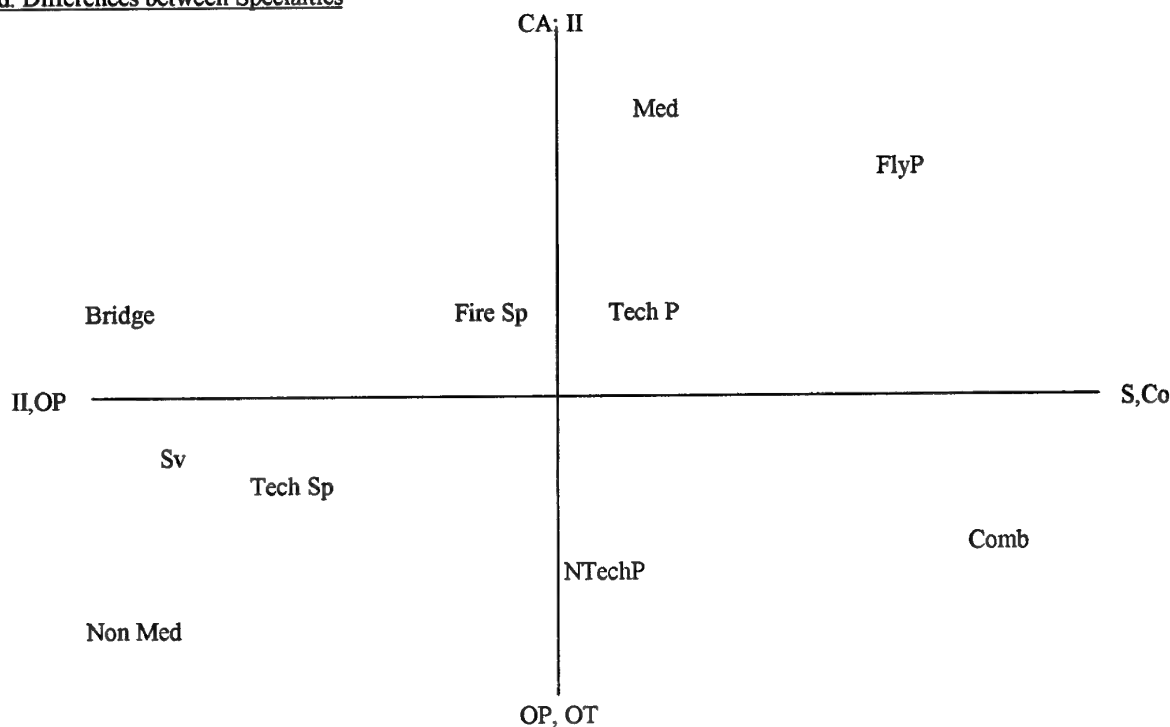
	Factor	Own name	Criteria
I	Extraversion/Introversion	Orientation towards People	Sicability, Communicative, Open to Others, Initiative, Self Confidence
II	Emotional Stability/ neurotiscism	Professional Strength	Achievement Motivation, Dare, Courage, Stamina, Authority,
III	Conscientiousness	Orientation towards the Task	Discipline, Sense of Responsibility, Care for Efficacy, Sense of Duty
IV	Agreeableness	Ideal Image	Style Flexibility, Polite, Team Spirit, Active Listening,
V	Openess	Cognitive Abilities	Analytic -, Synthetic-, Scientific Mind, Public Relations, Sense of Humor
VI	-----	Commitment	Servitude, Disponibility, Intrest for the Job,

**Figure 3.** Spatial representation of the groups means on the discriminant functions as dimensions.**3.a. Differences between status groups****3.b. Differences between study based groups**

CA: Cognitive Abilities  
 PS: Professional Strength  
 OP: Orientation towards People  
 OT: Orientation towards Task  
 II: Ideal image  
 Co: Commitment

**3.c. Differences between Services**

### 3.d. Differences between Specialties

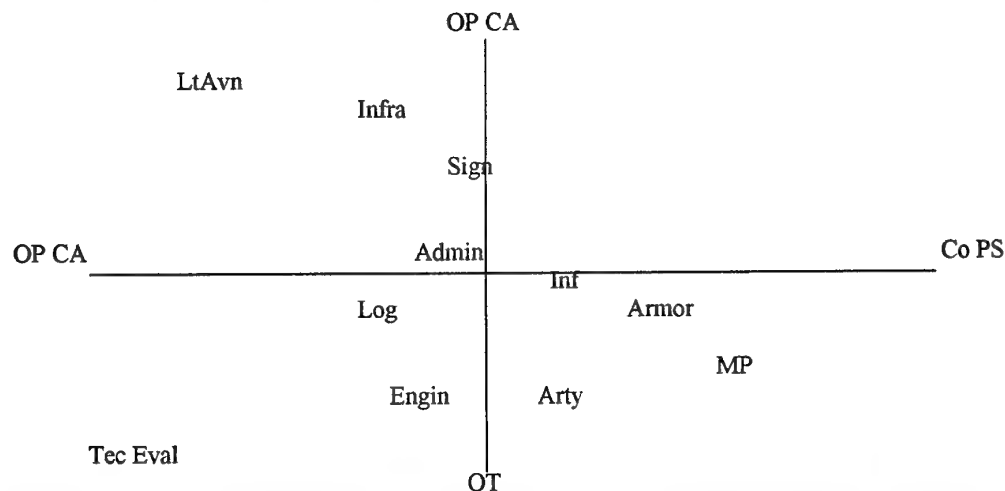


CA: Cognitive Abilities, PS: Professional Strength, OP: Orientation towards People OT: Orientation towards Task  
II: Ideal image, Co: Commitment

Med: Medical Corps, FlyP: Flying Personnel, Bridge: Navy Bridge Personnel, Fire Sp: Fire Support, Tech P: Air Force Technical Personnel, Sv: Services, Tech Sp: Technical Support, NTechP: Air Force Non Technical Personnel, Comb: Combat Troops, Non Med: Non medical Officers of the Medical Service

### 3.e. Differences between Arms (Army only)

	Tec Ev	Infra	Admin	LtAvn	Signal	Log	Arty	Engin	MP	Armor	Inf
1.Co PS	-6.4	-.6	-.1	-1.3	-.3	-.8	.5	-.4	1.5	1.0	.4
2.OT OP	-2.6	1.0	.3	1.1	.7	-.2	-.9	-.7	-.8	-.1	0.0
3. OT OP	1.6	.1	-.2	-.1	0.0	-.3	-.5	-.2	1.0	.1	.6



Tec Ev: Technical Evaluation of Material, Infra: Infrastructure, Admin: Administration, LtAvn: Light Aviation, Signal: Signal Troops, Log: Logistics, Arty: Artillery, Engin: Engineers, MP: Military Police, Armor: Armored Troops, Inf: Infantry

## Officer Selection in the federal Armed Forces of Germany

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### 1. Review of the German Selection System

After the end of World War II, Germany did not have any armed forces of its own for a period of ten years. Military officer selection, for the most part, still takes place according to principles that were introduced 1955, which had the objective of preventing as much as possible, any misuse of the armed forces. Only the careers of specialist officers, which were introduced much later, are governed by other rules.

The first applicants for commissioned service to be tested for aptitude during the establishment of the Federal Armed Forces (FAF) were former officers of the Wehrmacht, whose ability to lead military units was usually beyond any doubt because they had already sufficiently proven their ability during the war. Aptitude tests did not, therefore, initially focus on abilities the candidates needed in order to meet certain performance requirements, but on personality traits, attitudes and motives that had been declared selection criteria for political and moral reasons. By filling in questionnaires and talking to examiners in interviews, applicants had to prove that they were prepared, without any reservations, to uphold the values of the new democratic Constitution and to treat their subordinates as „citizens in uniform“. The guidelines for officer selection applicable at that time, incidentally, were reminiscent of the classical educational ideal of „mens sana in corpore sano“. It seemed that there was no demand for much more than a sound mind in a healthy body because elites of all kinds had fallen into disrepute due to the Nazi ideology.

After the first teams of instructors had been accepted for service, more and more young men without prior military service applied; they had to be tested not only for a democratic attitude, but also for the basic ability to learn and discharge leadership tasks. The aptitude test methods were supplemented accordingly, and repeatedly adapted to the changing requirements during the following years. Nevertheless, the following principles have largely remained unchanged.

#### A. Centralized Selection Procedure

The selection procedure for applicants for commissioned service is handled by a single central agency for all armed services and functional areas.

Exception:

Every armed service has its own procedure for the admission of qualified noncommissioned officers to the career of „officer specialist“ (with captain being the highest rank).

#### B. Uniform Selection Criteria

General aptitude for commissioned service is a requirement for both the acceptance of civilian applicants and the admission of military personnel to the career of line officer or of medical officer. In addition, applicants for flying service, whose general aptitude has already been recognized, must pass an additional specific fitness test at the Air Force Institute of Aviation Medicine in Fürstentfeldbruck. This requirement applies to pilot applicants in all three armed services.

#### C. Holism

A summary assessment is given for all of the applicant's relevant aptitude requirements.



There is no standard algorithm for determining the weights for combining different sources of aptitude data.

#### D. Commission Principle

The applicant's aptitude, or lack of it, is established in a unanimous vote by three persons with different educational and experiential backgrounds. This is supposed to prevent the risk of placing too much weight

on any specific aspect of aptitude, which can happen due to the large amount of discretion permitted by the principle of holism.

Of the current 333.000 FAF service members, 37.000 are commissioned officers. To maintain the level, approximately, 2.700 officers need to be replaced every year. In 1998, the distribution of young people accepted for commissioned service were as follows:

	Line officers	Medical officers/ military music officers	Officer specialists
Persons without prior military service and service members (conscripts or temporary career volunteers)	1.763	233	-
Noncommissioned officers	15	-	374
Reserve officers and other reinstated personnel	227	-	-
Personnel with special civilian qualifications (e.g. lawyers, doctors)	17	38	-
Total	2.022	271	374
Actual strength of commissioned officers	24.200	2.800	10.000

The following deals with officer candidates, who are referred to in the first line of the above table, i.e. those who start their officer career at the lowest rank. Two thirds of them are recruited from civilians attending school, shortly before they qualify for entrance to university or technical college. The rest of the candidates are recruited from soldiers who are either serving a ten-month period as conscripts or who have volunteered for two years or more of service. Some candidates are NCOs or reserve officer candidates. For those willing to enlist for at least twelve years, the Federal Armed Forces will subsidize a university degree at one of the FAF Universities at Hamburg or Munich; medical studies can be subsidized at other universities. The supply/demand ratio (total;  $12.500/2.500 = 5.7:1$ ) varies significantly between the different armed services and functional areas. The number of applicants per training slot is most favourable in the medical service (11.6:1), but this is because of the high proportion of female applicants (65 %). For line officers, the Air Force and the Navy (with ratios of 6.7:1) have problems finding line officers in only a few

functional areas. The Army (with a ratio of 4.3:1) must, in some branches, accept applicants with the lowest acceptable level of aptitude, and can still not satisfy all of its demands. The centralized, uniform selection system applicable to all armed services has the advantage that it is easier for applicants to change between the armed services and functional areas. In 1998, during the selection process about 30 % of all officer candidates changed their mind at least once about their original assignment preferences specified in the application forms. The selection procedure is handled by the Centre for Testing Applicants for Commissioned Service (Offizierbewerberprüfzentrale or OPZ), which is a part of the FAF Personnel Office (Personalamt der Bundeswehr), located in Cologne. The OPZ has a maximum testing capacity of 7.500 applicants per year. If there are more applicants, their number is decreased to the maximum capacity by a pre-selection based on school reports and on test scores from local recruiting centres. The OPZ assesses two groups of 85 applicants each per week. Usually, every Sunday and Tuesday afternoon two officers give a lecture on the most

important aspects of the military professions and training and about courses of study at an FAF university. For successful applicants, tests last about two days and the programme usually ends on Wednesday or Friday, with the planning of the details of their enlistment.

## 1. Officer Profile

Article 37 of the Legal Status of Military Personnel Act provides the legal basis for the selection of officer candidates. It outlines the mission to establish the fitness of „character, mind and body“, i. e. to assess the general aptitude for an officer career in any of the services. Apart from special requirements for certain branches, there are general requirements that every candidate should meet. The Ministry of Defence has never defined this vague concept of „general aptitude“ or given precise instructions for the selection of candidates, but has listed the following eleven aptitude factors which are to be assessed and rated on a seven point scale:

- conscientiousness
- leadership potential
- social competence
- style of expression and communication
- judgement, decisiveness
- learning and achievement motivation
- stress resistance
- reasoning
- professional and career orientation
- physical fitness

These aspects of suitability are not listed according to priority, and there are no instructions on how to weight them or evaluate different profiles; scores are simply summed up. More important than the score is the „qualification degree“ or „degree of aptitude“ for successfully completing officer training and performing successfully at the lowest officer rank.

- most suited
- well suited
- suited
- unsuited

Applicants are mainly selected with regard to their „general aptitude“ for an officer career. All officers are selected to be leaders, and despite their different assignments they have to meet some common requirements. With respect to the checklist of 11 aptitude factors, every applicant must meet a minimum standard. Although it is not exactly defined, it is assessed with a fairly high inter-rater reliability.

There is little doubt that the concept of „general aptitude“ is very useful for the purpose of negative selection, i. e. for the identification of applicants who are „not suited“ for officer training. There is a question of whether it is also a useful concept for the purpose of positive selection. Traditionally, the German officer is not a specialist, but a generalist. After being trained for certain rank level, he is expected to cope with any assignment at this level in his branch. Officers who want to reach the rank of general must be willing and able to take on a great variety of military assignments in a short period of time. What is needed for success is a high degree of adaptability and flexibility. In the German system of personnel selection and development, someone who is a „jack-of-all-trades“ has a better chance of success than someone who is highly, but narrowly, gifted.

## 2. The Selection Tools

The examiners use the following sources of information:

- The applicant's personnel files, which includes a curriculum vitae, school reports, efficiency reports and personal data. Additional questionnaires give information about the applicant's background, hobbies, and self-image.
- Information about intelligence and other relevant capabilities (e.g. concentration, mathematical knowledge) is gained by psychological tests.
- A short essay.

- An interview enables the panel members to identify and assess important personality traits which relate to the requirements of the officer profession.
- A short lecture, in which the applicant has to prepare and present a subject before other applicants and the panel. This shows the applicant's range of ideas, linguistic skill, and ability to speak freely.
- A round table discussion, in which three to four applicants develop ideas in an open discussion. This test permits the assessment of mental and personality factors.
- A group task in which the applicants jointly carry out a given task, e. g. prepare a planning document or an action plan.
- The applicant's physical fitness is established by a medical examination and a physical fitness test.

### 3. The Decision-making Process

The criterion of „general aptitude for commissionees service“ is, on the one hand, dichotomous in principle, i. e. an applicant is either „suited“ or „unsuited“ (go/no go). On the other hand an additional distinction is drawn between the degree of aptitude, using the rating „mostly suited“, „well suited“ or „suited“.

The assessment of the general aptitude of applicants is delegated to ten commissions (selection panels) which are responsible for eight to nine applicants per run. Every commission consists of an officer in charge (usually a former battalion commander), a captain (usually a former company commander) and a certified psychologist. Each member has one vote.

In an advisory talk, the applicant is counseled about training, particularly university studies, and future assignment. The general aptitude for commissioning training and the

ability to study are different areas of assessment. In the case of applicants with a university or technical college qualification, the test report will also contain a statement on the recommended course of study. In principle, every applicant who enlists for a minimum of 12 years and whose training also includes university studies can choose their area of study from the courses offered. However, because of the limited number of places in some courses of study, applicants are required to give at least two alternative choices. Changes can also be made during the officer training courses at the Officer Schools.

If there are more applicants for certain services, branches or subjects of study than are required, a top-down „selection of the best“ will be made. On the basis of the aptitude test results, an order of suitability will be established. Applicants who have been assessed as „well suited“ or even „most suited“ are normally enlisted with specifications about to time, place and unit given the day after the test. Applicants with a lower degree of suitability have to wait until all the other applicants who want to be enlisted at the same time for the same service have been tested.

Applicants wishing to enter the aviation service undergo additional tests at the Air Force Institute of Aviation Medicine. This includes assessment of their psychological fitness for flying and medical fitness for military flying duties. After this, OPZ decides on their enlistment.

# The Officer Selection in the Belgian Armed Forces

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## Summary

In this paper we will discuss the Belgian Armed Forces Officer Selection System (BAF). First of all we will put the Belgian Armed Forces Selection System in perspective by giving some basic information concerning the levels of selection and the numbers of candidates tested. We will give a brief description of the basic selection procedure and of the different possibilities to become an officer. Furthermore the general purpose of the selection system is discussed. Then we will go through the officer selection profile that the Armed Forces are looking for. Briefly there is an overview of the non-psychological techniques and we will look in more detail to the psychological selection procedures. At the end, some closing observations are given.

## Levels of selection

The BAF are composed of soldiers, Non-commissioned Officers (NCO's), and Commanding Officers (CO's). Therefore selection procedures are conceived at these three levels. Fig. 1 gives an overview of the numbers of applicants in relation to the number of vacancies. These applicants attended the selection sessions in 1997 organised by the Centre for Recruitment and Selection (CRS). Every year approximately the same number of candidates does visit the CRS.

As there is a Dutch speaking and a French speaking part in Belgium, the CRS has to create selection procedures in both official languages. This, of course, complicates the conception and execution of the selection.

In this paper we will concentrate upon the selection procedure for CO. The same procedure applies for both language systems.

Level	Number of Applicants	Vacancies
Soldiers	5000	700
NCO	1850	200
CO	700	130

Figure 1. Number of applicants

We will now give a description of the domains of the selection system used for candidate officers.

## Domains of selection

Basically, the normal selection procedure is composed of an administrative, a physical, a medical, a psychological and an academic part. The candidate can

be rejected if he scores underneath a certain critical score for certain tests. The physical, medical and psychological part, as a whole, takes three days to perform.

The most important elements of the selection are the traditional examinations (mathematics and languages) organised by the Royal Military Academy (RMA). These examinations also take two or three days.

In addition to the basic procedure, applicants for special functions have to perform some supplementary or different tests. An overview of special functions can be consulted in Fig 2.

Special Function	Remarks
Pilot, Navy	Medical, Physical, Intellectual
Special Recruitment	Academic qualifications
Industrial Engineers	Interview, Mathematics
Short Term Officers	Limited Career
Auxiliary Officers (Pilots)	Scientific and Maths exams
Complementary Recruitment	Limited Career
Social Promotion	NCO can become CO
Federal Police	Decision by Federal Police

Figure 2. Special functions

Because the BAF are a federal service, there are a lot of regulations and legal procedures to keep in mind. The officer selection system in the CRS is regulated by the basic document "Regulation A42".

Now we will take a look at the different ways to become an officer.

## Ways to become an officer

Mainly there are five ways to become an officer in the BAF (see Fig 3 and 4). (1) Via the PDRMA (the Preparatory Division of the Royal Military Academy). After the selection the candidates go to the RMA and either choose the "Polytechnics" or the "All Arms" Division. For specialised studies (e.g. medical school, merchant shipping) the candidates attend a civilian school, but are at the disposal of the military authorities. (2) Without following the PDRMA, the candidate may come directly to the CRS and he has, if selected, the

same career opportunities as the candidate who passed the PDRMA. (3) Via the selection procedure for auxiliary pilot, a candidate can be trained to become a jet pilot. These persons have limited career opportunities unless they succeed in the selection procedure later on. (4) Via the special procedure called "Officer Short term". Afterwards these candidates have the opportunity to become career officer. (5) On basis of academic qualifications (e.g. psychology, computer sciences) every year some specialists are recruited and selected. Here also, the possibility is given to become career officer after passing successfully the training.

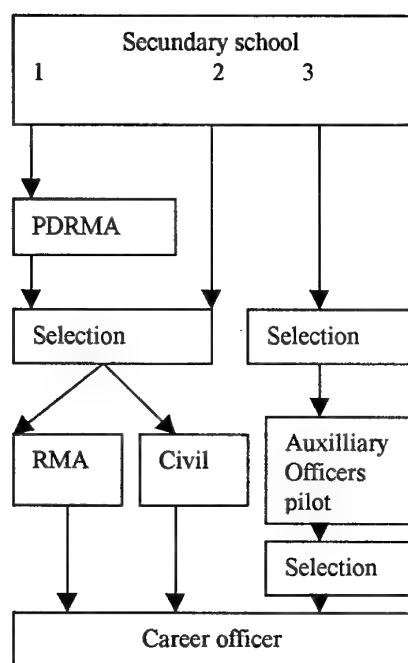


Figure 3. Ways to become an officer (1, 2, 3)

#### General purpose of the officer selection system

The general purpose of the BAF officer selection system is to define to what extent a candidate will be capable of –first of all- ending successfully a general training at the RMA and –secondly- a specific training at a Weapons School. In addition, the system aims at detecting to what extent a candidate will be capable of leading a group of people in difficult and dangerous circumstances. Practically, we compare the competencies of the candidate with the competencies shown in the officer selection profile.

What profile are we looking for? The crucial competencies of the officer profile are summarised in Fig 5.

Let us examine more closely the administrative, physical and medical parts of the selection procedures.

#### Non psychological selection

Some administrative requirements are to be fulfilled in relation to the officer application level. One can look at it as a pre selection or screening on topics, such as: degree of instruction, age, nationality, etc. To test the physical fitness the following procedures are used: an ergometric bicycle, a power test, a test of balance and a shuttle run. The medical examinations are the responsibility of the medical staff of the CRS. Finally there are a few traditional examinations organised by the RMA. These exams are the main factor for the final classification of the candidate.

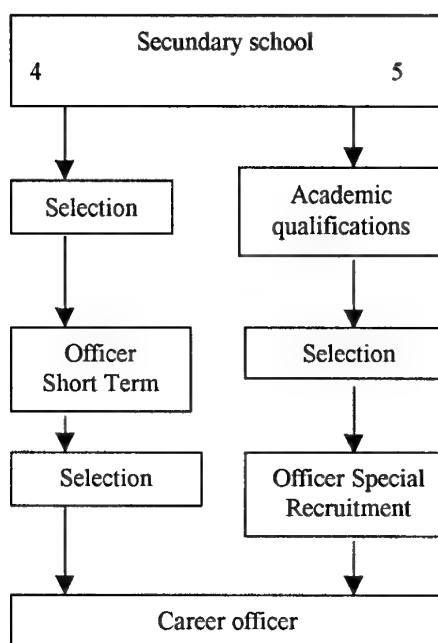


Figure 4. Ways to become an officer (4,5)

<i>Attitude</i>	<i>Potential</i>
Physical resistance	General look
Dynamism	Balance
Handiness	Discipline
Appearance	
<i>Leadership</i>	<i>Motivation</i>
Sociability	Intrinsic
Initiative	Instrumental
Authority	
Decisiveness	

Figure 5. Competency profile of an officer

The reader will find in the following sections an outline of the psychological procedures used for candidate-officers

### Psychological selection

The main purpose of the psychological selection is to test the intellectual and personal characteristics of the candidates, to make a prediction about their future functioning as an officer and to reject the candidates who do not meet the minimal criteria.

The total selection procedure for a candidate-officer takes three days. The first day, the candidate performs the physical and medical tests; the second day he has to complete questionnaires, cognitive tests, personality tests and motivational inventories; finally, the third day, the candidate's behaviour is assessed in group situational tasks and a semi-structured interview closes this final day.

Van Beirendonck (1998) gives an overview of the selection tools for candidate-officers used by the CRS.

To decide whether a candidate is sufficiently competent, different scores are calculated: a score indicating the intellectual potential (PINP), an interview score, a score based on the group situational tasks and a final score, which is given by a Selection Board.

Let us now briefly review the tools implemented for psychological selection.

### Cognitive assessment

Here, the BAF want to obtain an evaluation of the intellectual potential (PINP). Tests are being used, measuring verbal and abstract reasoning, spatial ability, a verbal factor, memory and flexibility in organising things. Some of the tests are paper and pencil-tests, other tests are of the computer assisted-type. The PINP score results out of a combination of test scores and different coefficients are used in the calculation.

### Personality assessment

The candidates are asked to complete a questionnaire concerning their past experiences, called an Autobiographic Form. Recently a short form of the CPI (California Psychological Inventory) has been added to the set of personality measures. A Self-description and a Self Evaluation-rating scale are also taken. Motivational inventories include scales to evaluate the military educational system, the acceptance of the military way of living and the vocational values.

Very important in the assessment of the personality is the way a candidate performs group situational tasks. The applicants have to attain objectives in four group tasks. Groups are composed of 5 to 7 persons. The four tasks are the ROMAT (Role Modelling Area Task), a leaderless group discussion, a speech and the construction of an observation post. Visual representations of candidates performing each test are given in Fig. 6 (ROMAT), Fig. 7 (Discussion), Fig. 8 (Speech) and Fig. 9 (Construction).

For the ROMAT each applicant is responsible for the implantation of an installation following certain objectives and limitations. In the discussion the participants have to organise the relief of foreign



Figure 6. ROMAT



Figure 7. Discussion

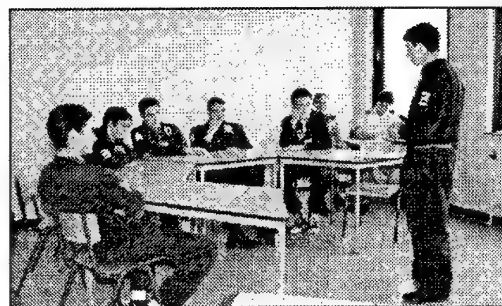


Figure 8. Speech



Figure 9. Construction

refugees. After preparing for their speech about an imposed topic, the candidates are asked to talk to the other participants and convey their message. Another kind of task is the realisation of a construction with metal tubes in order to build a frame of an imposed object.

The evaluation of the performance in these group tasks is the responsibility of a Selection Board, bringing together all the assessors.

### Interview

The interview is structured following the criteria mentioned in the selection profile of the candidate officer (Fig 4).

The aim of the semi-structured interview is to test hypotheses about certain competencies of the candidate and to come to a synthetic view of the applicant's personality in relation to the function of future officer. A psychologist or an officer who got an appropriate psychological training conducts the interview. To get a certain standardisation and to ascertain a minimum level of objectivity there is a manual with definitions of acts and the corresponding interpretations and scores.

Generally spoken, the interviewer is one of the observers or assessors for the group tasks.

### Psychological report and final decision

First of all scores are given by the interviewer, in relation to the different categories of the officer selection profile. A computer programme calculates next a final score.

In addition to this quantitative measure, the psychological report is completed with a description of the relevant characteristics of the applicant.

A commission, composed of the interviewer-assessors and supported by a psychologist, discusses each candidate and gives a final mark from 1 to 9. Applicants scoring lower than 4 are rejected.

### Discussion

The BAF selects candidate officers using administrative, physical, medical and psychological techniques. Traditional examinations play the most important role. The CRS is responsible for the physical, medical and psychological selection and partly for the administrative selection.

This paper has focused on the responsibilities of the CRS and has thrown especially a light upon the psychological testing procedures.

The predictive value of the selection procedure for candidate officers could possibly be ameliorated if the BAF would emphasise more the psychological results and lower the impact of the traditional examinations! Alan Jones (1991) discussed possible contributions of psychologists to military officer selection.

To ameliorate the predictive power, accelerate and modernise the selection procedures, more computers,

computer specialists and psychologists are needed in view of better, more flexible and efficient armed forces!

### Bibliography

- Van Beirendonck, L. (1998). *Beoordelen en ontwikkelen van competenties. Assessment Centers, Development Centers en aanverwante technieken*. Leuven: Acco.
- Jones, A. (1991). The Contribution of Psychologists to Officer Selection, In R. Gal & A. D. Mangelsdorff (Eds) *Handbook of Military Psychology*, pp 63-80. John Wiley & Sons



# Selection of Officers for U.S. Naval Aviation Training

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## Summary

This paper reviews the process of selecting officers for U.S. naval aviation training and describes one of the principal selection tools, the Aviation Selection Test Battery (ASTB). The 1992 version of the ASTB is a paper-and-pencil test administered to all applicants for naval aviation training. ASTB scores and ground school and flight training performance data were available for 2852 student naval aviators and student naval flight officers, and these data were used to re-assess the validity of the ASTB in predicting student performance. The results indicated that the ASTB remains a valid predictor of ground school and flight training grades, and to a lesser extent, attrition from training. For a small subset of the sample used in these analyses, data from a computer-based performance test (CBPT) were also available. The CBPT required subjects to engage in multi-axis tracking tasks concurrently with other cognitive tasks, such as dichotic listening and working memory tasks. Scores from the ASTB, the CBPT, and grades from ground school were entered into a linear regression upon primary flight training grades. The results showed that the combination of ground school and CBPT scores can be used as a good predictor of performance ( $R^2 = .33, p < .0001$ ). Although these results will require cross validation, the CBPT shows promise as a new selection tool. The importance of these results is discussed in the context of a recently developed computer-based version of the ASTB.

## Introduction

Earning the wings of a U.S. naval aviator is a goal that many seek. Each year, approximately 10,000 individuals demonstrate this interest by taking the U.S. Navy and Marine Corps Aviation Selection Test Battery (ASTB). The ASTB is one of the initial filters in selecting students for training as either pilots or naval flight officers (NFOs, who perform navigation and weapons systems duties in the cockpit). This paper describes the ASTB and reviews the aviator selection process, and then presents analyses that were conducted on data from existing and potentially new methods of selecting U.S. Navy pilots.

## The ASTB

The ASTB was originally introduced in 1942, and revisions followed in 1953, 1971, and 1992 (Frank &

Baisden, 1993). The current 1992 version was developed and validated by Educational Testing Services of Princeton, New Jersey. It is a paper-and-pencil test that takes approximately 2.5 hours to administer, and consists of six sub-tests. The six sub-tests are the math-verbal test, the mechanical comprehension test, the spatial apperception test (which measures spatial reasoning abilities), the aviation and nautical information test, the biographical inventory (which contains questions on personal history and interests), and the aviation interest test. Weighted combinations of the sub-tests are used to calculate the following three scores used in the pilot selection process:

1. The academic qualification rating (AQR) - validated to predict academic performance in ground school.
2. Pilot Flight Aptitude Rating (PFAR) - validated to predict flight grades in primary flight training.
3. Pilot Biographical Inventory (PBI) - validated to predict attrition through primary flight training.

The Naval Operational Medicine Institute (NOMI) oversees the ASTB testing program, including test distribution, official scoring, and database management.

## The Selection Process

The ASTB plays an early role in narrowing down the very large field of those who apply for naval aviation training. Data provided by NOMI show that approximately half of those taking the ASTB fail to meet minimum selection scores. Those who score favorably must then undergo a thorough physical examination to ensure that they meet medical standards. Approximately 25% do not pass the physical screening process. Those who remain eligible are interviewed by two officers who complete an evaluation form on the applicant, and the applications are forwarded to a three-member evaluation board. This board usually consists of two naval aviators and a program manager who is knowledgeable of current and projected demands for naval aviators. Approximately half of the applications are recommended for selection by the board. Upon final approval, the selected applicants are offered the opportunity to enter naval aviation training. Overall, then, only about 15% of those who take the ASTB are selected to begin training.



Applicants who were selected from the U.S. Naval Academy (USNA) or from Naval Reserve Officer Training Corps (NROTC) programs begin 6 weeks of ground school training at Aviation Pre-flight Indoctrination (API). API is located at Naval Air Station Pensacola, and students must master topics such as aerodynamics, fundamentals of turbine engines, air navigation, flight rules and regulations, aviation physiology, and water survival. Applicants who did not graduate from either the USNA or an NROTC program must first complete 13 weeks of Officer Candidate School before beginning API. After completing API, pilots and NFOs proceed to separate primary flight training programs.

Given the important role that the ASTB plays in the selection process, it is important to assess its validity continually. Frank and Baisden (1993) and Hiatt, Mayberry, and Sims (1997) have examined the predictive validities of ASTB scores, and their findings are summarized in Table 1. The  $r$  values represent correlations uncorrected for restriction of range. Note the negative association between PBI scores and attrition status, indicating that those with higher PBI scores are less likely to fail out of primary flight training.

**Table 1**

Previously reported correlations between ASTB scores and criterion variables

	Frank & Baisden (1993)	Hiatt, et al. (1997)
AQR : academic performance in API	$r = .40$ $p$ not reported	$r = .42$ $p < .05$
PFAR : primary flight training grades	$r = .27$ $p$ not reported	$r = .40$ $p < .05$
PBI : attrition from primary flight training	$r = -.25$ $p$ not reported	$r = -.12$ $p < .05$

Damos (1996) reviewed correlations between flight training performance and a wide variety of other aviation selection tests and found results comparable to those for the ASTB. Although the correlations are statistically significant, the best that can be said for most of them, including those for the ASTB, is that they are only moderately strong. Selecting pilot candidates and predicting their flight training performance is unquestionably a very difficult and complex endeavor, yet it seems that we should be able to do better.

For several decades, scientists at the Naval Aerospace Medical Research Laboratory (NAMRL) have been developing aviator selection tests that could be used in conjunction with the ASTB. These efforts have been reviewed by Blower and Dolgin (1991). Many of these tests are computer-based and measure a participant's cognitive and psychomotor skills in both single- and dual-task/divided attention contexts. The fact that these tests include psychomotor tasks that must be performed in a divided attention setting brings them a step closer to

representing what is demanded of the pilot in the cockpit, as compared to the paper-and-pencil ASTB. With this in mind, we set out to reexamine the validity of the aging ASTB and to identify any incremental validity that computer-based tests could add to the current methods used to select applicants into aviation training.

## Method

As part of an ongoing project, NAMRL has obtained a large set of ASTB and flight training scores. ASTB scores were provided by NOMI, API scores by Naval Aviation Schools Command (NASC), and flight training grades by Training Wing Five and the Chief of Naval Air Training (CNATRA).

The first goal of analyzing the data was to determine the degree of association between ASTB AQR scores and API grades. AQR scores and API grades were available for 2852 individuals. This group included students in both the pilot and NFO programs. Since the ground school curriculum at API is identical for pilots and NFOs, we decided to include both groups in the analysis. The group consisted of 2687 males and 165 females, and they were enrolled in API between November 1993 and October 1998. The Pearson correlation coefficient between AQR and API scores was calculated for this group.

The second goal was to find the strength of association between the PFAR and primary flight training grades for the student pilots in the sample described above. There were 1660 individuals for whom both PFAR and primary flight grades were available. Of this group, 1573 were male and 87 were female. These students were enrolled in primary flight training between November 1993 and July 1998. The Pearson correlation coefficient between PFAR and primary flight training grades was calculated for this group.

The third goal was to determine the strength of association between PBI scores and attrition status for students in the sample. The PBI was originally validated to predict attrition due to flight failure, drop on request (voluntarily withdrawing oneself from training), or academic failures. Therefore, cases of attrition due to medical, family hardship, or unidentified reasons were removed from the sample. For the remaining cases, an attrition variable was created and coded as 0 for those who successfully completed primary training or 1 for those who failed to complete due to attrition from either API or primary flight training. In a total of 1849 cases available for this analysis, 1744 were male and 105 were female, and they were enrolled in API between September 1993 and October 1998. Again, the correlation coefficient between PBI scores and attrition status was calculated for this group.

In addition to the selection and training data described above, NAMRL researchers collected psychomotor task data on 210 student pilots who were waiting to begin API.

All subjects participated on a voluntary basis. The 200 males and 10 females were enrolled in API between October 1995 and February 1999. Data were collected using the Computer Based Performance Test (CBPT) battery (Blower & Dolgin, 1991), which includes a series of tracking and information processing tasks presented in single- and dual-task contexts. The CBPT battery runs on personal-computer-type processors, and for this study IBM-compatible 486 processor-based machines were used. Each of the CBPT test stations includes two commercially available joysticks, a set of rudder pedals, a set of stereo headphones, and a numeric keypad that the subject uses for keyboard inputs. The tracking tasks are presented on a standard VGA monitor.

The first task in the CBPT is a two-dimensional (2-D) compensatory tracking task in which the subject uses a joystick to keep a cursor centered over a set of crosshairs that intersect in the middle the computer screen. The cursor is continuously driven by horizontal and vertical disturbance functions that work to displace the cursor from the center. The computer records combined horizontal and vertical error as cursor pixel distance from the center of the crosshairs. The difficulty of this task is increased by the fact that the cursor is reverse-controlled in the horizontal axis. That is, moving the joystick to the left moves the cursor to the right, and vice versa. In the vertical axis, control is more stereotypical. Moving the joystick forward moves the cursor downward; moving the joystick aft moves the cursor upward. Subjects are instructed to use their right hand to control the joystick. The 2-min 2-D tracking task is preceded by a 2-min practice session.

The second part of the CBPT is a dichotic listening task (DLT) that requires the subject to selectively attend to information presented to either the left or right ear. Two different streams of letters and single digit numbers are simultaneously presented to each ear over the headphones. The subject must pick out each number presented to the target ear and enter the number via the numeric keypad. The computer assigns the target ear before each trial. There are 12 trials, each presenting 9 numbers and 13 letters to each ear. Subjects receive four practice trials before beginning the DLT, which takes 5 min to administer. The number of correct responses is recorded automatically.

The third part of the CBPT requires the subject to simultaneously perform both the 2-D tracking task and the DLT. The computer presents 5 min of the 2-D tracking task, during which the subject engages in the DLT.

The fourth task in the CBPT adds an additional cursor that moves only in the horizontal axis at the bottom of the computer screen. The subject must keep this cursor centered using the rudder pedals, while still keeping the original 2-D tracking task cursor centered with the joystick. Rudder cursor input control is conventional: left rudder input moves the cursor left, while right rudder input

moves the cursor right. This fourth task is 2 min in duration and is preceded by a 2-min practice session.

The fifth CBPT task adds the DLT to the fourth task. Subjects engage in the 2-D tracking task, the rudder tracking task, and the DLT simultaneously for a 2-min practice session and then begin the 2-min test session.

The sixth CBPT task adds yet another cursor that moves only in the vertical axis along the left side of the computer screen. The subject must keep this cursor centered in the vertical axis with a second joystick mounted on the left side of the test station. Subjects are instructed to use their left hand to manipulate this second joystick. Cursor control is again conventional: forward stick input moves the cursor downwards while aft stick input moves the cursor upwards. In this sixth task, the subject must also keep the original 2-D cursor and the rudder cursor centered with the right hand joystick. There is no DLT associated with this three-cursor task, and 2 min of practice precede 2 min of testing.

The seventh CBPT task is also a tracking task, but it is not associated with or added to any of the tasks described above. It is a one-dimensional (horizontal) tracking task that requires the subject to keep a cursor centered on a target within a horizontal rectangle. Control mapping of the cursor is standard in that left joystick movement moves the cursor to the left, and right input moves it right. Similar to all of the other previous tracking tasks, the cursor is continuously driven by a disturbance function that works to displace the cursor off center. The subject engages in six 2-min trials, with a 30-s rest period between trials.

The eighth CBPT task is a working memory task in which the subject must calculate the absolute difference between single digit numbers that are sequentially presented on the computer monitor. In all cases, the correct answer ranges from 1 to 4, and the subject is instructed of this fact. The subjects input their responses via the numeric keypad using their left hand, and the computer automatically records the number of correct responses. The task is self-paced in that each response causes the next number to appear on the screen. The absolute difference (AD) task is presented as a single 2-min test.

The ninth task is a dual-task combination of the horizontal tracking task and the absolute difference task. Subjects engage in three 2-min trials of this dual-task test.

The tenth and final test of the CBPT is a mental rotation task called the Manikin Test. In the CBPT version of the Manikin Test, simplified drawings of a sailor appear on the computer monitor. The sailor is holding a red square in one hand and a green circle in the other. The object in each hand alternates randomly and sailor appears randomly in one of four orientations: upright and facing the subject, upright with his back towards the subject, upside down and facing the subject, or upside down with his back towards

the subject. The subject's task is to quickly determine which of the sailor's hands (right or left) is holding the red square. Subjects indicate their response by pressing one of two keys on the numeric keypad. The Manikin Test is self-paced, with each response triggering the next stimulus. The computer automatically records the number of correct responses. This test is composed of four 2-min trials.

For all of tracking tasks listed above, subjects were instructed to maximize tracking accuracy. For the DLT, AD, and Manikin tasks, subjects were instructed to respond as quickly and accurately as possible. On dual-task tests, subjects were instructed to perform as well as possible on each task, and to give each equal priority.

The CBPT provides a source of at least 10 variables that might be of use in predicting primary flight training performance. API grades and the 3 ASTB scores increase this number to a pool of 14. Our fourth goal was to reduce this to a more practical number and then conduct an exploratory analysis to identify promising predictors. To narrow down the large number of potential predictors, variables were selected according to three decision strategies:

1. If there were a priori reasons to believe that a variable would make a good predictor, it was selected for analysis. This criterion pointed to the PFAR score, which has been shown to predict primary flight grade, and API grades because the API curriculum is designed to cull out students who are likely to have trouble in primary flight training.
2. Variables that were measures of dual- or multi-task performance were favored because, at a basic level, such performance is what is required of the pilot in the cockpit. However, more complicated psychomotor test batteries are often burdened with reliability, calibration, and quality control problems that have led to a poor history of wide-scale implementation (Griffin & Koonce, 1996; North & Griffin, 1977). With this in mind, the CBPT variables that required the rudder pedals or more than one joystick were eliminated and the following variables were chosen:
  - a) 2-D tracking task scores and DLT scores, where these tasks were performed in combination with each other.
  - b) Horizontal tracking task scores and AD task scores, again where these tasks were performed in combination with each other. Because there were three trials in this set, scores were averaged across the trials.
3. We also decided to include the Manikin Test variable, because this task is unique in that it requires the subject to engage in mental rotation, rather than in a tracking task.

These procedures reduced the pool of potential predictors to the following seven: PFAR score, API score, 2-D tracking error, DLT score, horizontal tracking error, AD

score, and Manikin Test score. The variables were examined for extreme outliers, as defined by values more than three standard deviations above or below the mean. This procedure eliminated 2-D tracking data for four subjects, horizontal tracking and Manikin data for three subjects, and DLT data for two subjects. Also, PFAR scores were not available for nine subjects.

The remaining data were then analyzed in a stepwise linear regression upon primary flight grade. The  $p$ -value to enter was set at  $p < 0.05$ , and the value to remove was set at  $p > 0.10$ .

## Results

### Correlation Analyses

Summary statistics for all variables analyzed in the correlation analysis of ASTB scores, API grades, and primary flight grades are presented in Table 2 below.

**Table 2**  
Summary Statistics of ASTB Scores, API Grades, and Primary Flight Grades

Variable	Mean	SD	N
AQR	188.0	23.4	2852
API Grade	49.1	6.9	2852
PFAR	207.5	23.6	1660
Primary Flight Grade	47.6	10.4	1660
PBI	58.8	8.6	1849

The analysis of association between AQR scores and API grades showed a significant correlation between the two variables ( $r = .47$ ,  $p < .0001$ , two-tailed), indicating that API grades increase with increasing AQR scores. The analysis of PFAR scores and primary flight grades also yielded significant results ( $r = .36$ ,  $p < .0001$ , two-tailed), indicating that primary flight grades increase with increasing PFAR scores. The final correlation analysis was between PBI scores and attrition status. Individuals who failed out of the program were coded with a value of 1 for this variable, while those who successfully completed were coded with a 0. This analysis also revealed a significant correlation between the two variables ( $r = -.10$ ,  $p < .0001$ , two-tailed). Those with higher PBI grades were less likely to fail out of the program.

### Regression Analysis

The stepwise multiple regression analysis yielded a two-variable model for predicting primary flight grade. The results are summarized in Table 3. The variables included in the model were API grade and 2-D tracking error, and they accounted for 33% of the variance seen in primary flight grades (adjusted  $R^2 = .33$ ,  $p < .0001$ ).

**Table 3**  
Summary of Regression for Variables Predicting Primary Flight Grade

Step	1	2
Variable	API Grade	2-D Tracking Score
$R^2$	.251	.339
Adj. $R^2$	.247	.332
$\Delta R^2$	.251	.088
$B$	.689	-.0002
$SE B$	.092	.0001
$\beta$	.443	-.303
$p <$	.0001	.0001

Note.  $\Delta R^2$  for step 2,  $p < .0001$

Although API grades were included in the model above, they are not available until after the student completes the 6-week API curriculum. However, AQR scores are available early in the application process, fairly soon after the applicant takes the ASTB. Because AQR scores were shown to be good predictors of API grades, we decided to run a second regression analysis similar to the first, but replacing API grades with AQR scores. This analysis also yielded a two-variable model that included 2-D tracking error and PFAR score, rather than AQR score. This model accounted for 17% of the variance in primary flight grade (adjusted  $R^2 = .173$ ,  $p < .0001$ ), and is summarized in Table 4. Table 5 presents summary statistics for all variables used in the regression analyses.

**Table 4**  
Summary of Second Regression for Variables Predicting Primary Flight Grade, Replacing API Grade With AQR Score

Step	1	2
Variable	2-D Tracking Score	PFAR Score
$R^2$	.150	.181
Adj. $R^2$	.146	.173
$\Delta R^2$	.150	.031
$B$	-.0003	.0961
$SE B$	.0001	.0352
$\beta$	-.376	.1773
$p <$	.0001	.0001

Note.  $\Delta R^2$  for step 2,  $p = .007$

**Table 5**  
Summary Statistics of Variables Used in the Regression Analyses

Variable	Mean	SD	N
AQR	192.4	19.7	201
PFAR	213.1	18.7	201
2-D Tracking Error	28033.9	13127.4	206
DLT	98.6	8.9	208
Horizontal Tracking Error	29414.7	13646.4	207
AD	59.3	13.7	210
Manikin	83.1	19.5	207
API Grade	52.1	6.9	210
Primary Flight Grade	51.0	10.1	210

## Discussion

The purpose of the efforts described in this paper was to reexamine the predictive validities of the ASTB and to explore possibilities for new tests that could improve the U.S. naval aviator selection process. Although the current version of the ASTB was introduced 7 years ago, the  $r$  values found here generally indicate that it is still performing well. The AQR was designed to predict API grades, and the correlation analysis of these two variables shows that as AQR scores increase so do API grades. By squaring the correlation coefficient of  $r = .47$ , we see that AQR scores can account for some 22% of the variance in API grades. This correlation coefficient of  $r = .47$  is somewhat stronger than, yet still consistent with, results reported elsewhere (Frank & Baisden, 1993; Hiatt et al., 1997). It also compares favorably with other types of aviation selection tests (see Damos, 1996).

It should be emphasized that the relationship between AQR scores and API grades was observed within a sample of rigorously selected candidates. Therefore, the range of values for both the predictor and outcome variables is certainly restricted as compared to what would be seen if all applicants were permitted to enter training. This condition limits the potential strength of association. The same range restriction is operating on all of the analyses reported here.

The relationship between PFAR scores and primary flight grades also remains fairly strong, with an observed  $r = .36$ . This value falls in between those reported by Frank and Baisden (1993) and Hiatt et al. (1997), but it is generally consistent with them (see Table 1). The fact that a simple, inexpensive, paper-and-pencil test can predict cockpit performance as well as this one does is impressive, and we can conclude that the PFAR continues to serve its purpose well.

The PBI was originally validated to predict attrition up through the primary flight training portion of flight instruction. The correlation coefficient between PBI scores and attrition status in our analysis was  $r = -.10$ . Although this value was statistically significant and indicates that those with higher PBI scores are less likely to fail in training, this association is not very strong. It was comparable to that reported by Hiatt et al. (1997) but weaker than that reported by Frank and Baisden (1993). Given that the predictive power of the AQR and PFAR have held up over the years, this result is somewhat puzzling, but we offer a possible explanation.

The ASTB was validated by Educational Testing Services on a sample of individuals who had taken the test once, and the  $r$  values reported by Frank and Baisden (1993) reflect this validation. The current ASTB testing policy states that an individual may take the test for a second time 30 days after the first testing. After the second testing, retesting is allowed at 180-day intervals, and there is no

limit to the number of retests. In all cases, the most recent scores replace any previous scores. Individuals who take the ASTB for the first time and receive a low score on the PBI may be inclined to change their PBI answers upon retesting, in order to improve the score. The nature of the PBI lends itself to this sort of behavior. By contrast, a person must increase his/her knowledge of the subject matter covered on the portions of the test used to compute the AQR and PFAR scores (i.e., the math-verbal, mechanical comprehension, spatial apperception, and aviation and nautical information tests). This is a much more difficult proposition, and may account for the consistent validities of these scores. By comparing the predictive validities of one-test-only PBI scores to re-test PBI scores, the accuracy of this explanation could be determined. It may well be the case that one-test-only PBI scores have retained their original validity, and this seems to be an appropriate issue for future analysis.

The regressions conducted in the exploratory analysis of the CBPT scores were performed to identify the best variables for predicting primary flight training performance, and stepwise procedures were chosen for this purpose. We are aware that stepwise regression is sometimes criticized for its increased exposure to the possibility of capitalizing upon chance. However, as Hayes (1988) has pointed out, in exploratory analyses such procedures are appropriate provided that selected variables are subject to subsequent independent validation. Accordingly, we would indeed cross-validate any new selection test before recommending it for implementation.

The results of the regression analyses were straightforward and promising at least from a research standpoint. In the first regression, the model included API scores and 2-D tracking scores, accounting for 33% of the variance in the primary flight grades. Prior to conducting this analysis, the best predictor of primary flight grade was the PFAR score, explaining 13% of the variance in the correlation analysis sample. Thus a model that can include API grades and 2-D tracking scores represents a substantial improvement.

From a practical selection standpoint, however, the utility of this first model is limited. In order to obtain API grades, an applicant would first have to complete 6 weeks of ground school. Nevertheless, there are other useful applications for such a model. One example would be to use it for aviation progress review boards. These boards evaluate students who are having difficulty in flight training, and board members must make a recommendation on whether the student should be retained or separated from training. Any tool that can provide an objective assessment of the student would be extremely useful to the board. If this model can be validated, it would certainly fill this role.

The second regression was performed to analyze variables that could be made available before an individual entered training. AQR and PFAR scores meet this requirement. If

a version of the CBPT could be implemented, these types of scores would be available as well. The second regression showed that a model incorporating 2-D tracking and PFAR scores accounted for 17% of the primary flight grade variance in our sample. While not as strong as a model that can include API grades, it is an improvement over the current practice of using PFAR scores alone.

The final issue to be addressed is that the results of these analyses come at an opportune time. NAMRL has recently introduced the Automated Pilot Examination (APEX) system, which is a computer-based and networked version of the ASTB. APEX has been successfully operating at several recruiting sites for the past year, and it has performed well. Because APEX is computer-based, it should be possible to include portions of the CBPT into APEX. The analyses reported here indicate that the 2-D tracking task/DLT combination is a good candidate for inclusion. This would greatly facilitate validation efforts, because any applicant who was tested on the APEX system would also be providing 2-D tracking task data (even though those data would not be used for selection purposes during this validation phase). Some of these applicants would eventually enter aviation training, and when they did their CBPT data would already be available for analysis and validation. In this manner, NAMRL could continue to make significant contributions in improving the process of selecting U.S. naval aviators.

## References

- Blower, D. J., and Dolgin, D. L. (1991). *An evaluation of performance-based tests designed to improve naval aviation selection* (NAMRL-1363), Naval Aerospace Medical Research Laboratory, Pensacola, FL. (AD A258 200)
- Damos, D. L. (1996). Pilot selection batteries: Shortcomings and perspectives. *The International Journal of Aviation Psychology*, 6, 199-209.
- Frank, L. H., & Baisden, A. G. (1993). The 1992 Navy and Marine Corps Aviation Selection Test Battery development. *Proceedings of the 35<sup>th</sup> Annual Conference of the Military Testing Association*.
- Griffin, G. R., & Koonce, J. M. (1996). Review of psychomotor skills in pilot selection research of the U.S. military services, *International Journal of Aviation Psychology*, 6, 125-147.
- Hayes, W. L. (1988). *Statistics*. Fort Worth: Holt, Rinehart and Winston.
- Hiatt, C. M., Mayberry, P. W., & Sims, W. H. (1997). *Revalidation of the Aviation Selection Test Battery* (CAB 97-18). Center for Naval Analyses, Alexandria, VA.

North, R. A., & Griffin, G. R. (1977). *Aviator selection 1919 -1977* (NAMRL Special Report 77-2). Pensacola, FL; Naval Aerospace Medical Research Laboratory. (AD A040 105)

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## CAPSS: The Canadian Automated Pilot Selection System

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**Summary:** The Canadian Automated Pilot Selection System (CAPSS) is a computerized simulator of a single engine light aircraft used in the selection of pilots for the Canadian Forces. This paper describes the characteristics of the CAPSS simulator and the types of data it collects. The development of the CAPSS equation that predicts the probability of success in flying training is discussed and the results of the initial validation and cross-validation are presented. Demographic characteristics of applicants assessed by CAPSS since its introduction in February, 1997, are presented. Finally, some of the strengths and weaknesses of CAPSS are discussed.

The assessment of officer applicants for the Canadian Forces follows the same general procedure for all officer entry programs. An additional step in the

assessment of pilot applicants is testing with the Canadian Automated Pilot Selection System (CAPSS). CAPSS is a computerized moving-base simulator of a single engine light aircraft. The CAPSS simulator presents the candidates with all the information necessary to perform flight manoeuvres using instrument flying procedures. A computer system runs the simulator, presents all instructions and feedback, and collects the data. The entire syllabus consists of five one-hour sessions; the first four sessions are currently used for assessing pilot applicants. The sessions proceed from basic instructions and flying a simple straight and level manoeuvre to flying a complex traffic pattern. The CAPSS computer system stores each candidate's data and produces summary statistics of each candidate's performance. An outline of the complete syllabus is presented in Table 1.

Table 1. CAPSS Syllabus

Session	Tasks
1	Basic flight instruments and controls; straight and level flight; straight climb; straight descent
2	Review; take-off, climb-out and level off; level turns; standard rate turns
3	Review; climbing and descending turns
4	Review; rectangular course; airport traffic pattern
5	Review; airport traffic pattern with side tasks; landing

Note: Session 5 is not used in actual pilot selection

Ten flight parameters are monitored and recorded twice per second while each candidate is "flying", although not all parameters are relevant to every flight task. The parameters are heading, turn rate, bank angle, side slip, altitude, vertical speed, engine speed, airspeed, and "x" and "y" Cartesian coordinates indicating current position. This results in 1200 data points per candidate for every minute of simulator operation.

Dr. Barry Spinner of the University of New Brunswick developed the plan for taking the mass of data produced by CAPSS and transforming it into a single equation used to predict the probability of success at flying training (Spinner, 1988a, 1988b, 1989, 1990). The overall plan of analysis was to divide the data according to the basic manoeuvre being performed. Within each manoeuvre, the data were broken into a number of discrete, statistically manageable data segments. Within each of these data

segments, Summary Measures (SMs) were formed to characterize candidate operation of the simulator over a brief period of time. The SMs within a data segment were reduced using statistical methods, then the segments were combined into subgroups and the SMs were again reduced. This cycle of reduction and combination was repeated within each manoeuvre to produce a combination of SMs that optimally predicted performance in flying training.

A hierarchy of CAPSS flight tasks was designed to organize the data and to specify the order in which these subsets were combined. Flight tasks were categorized according to the type of manoeuvre being flown, the context within which the flight task was performed (simple practice or part of a more complex flight task), which repetition of the task was being performed, the flight parameter being monitored, and whether the data were extracted from the beginning or end of the flight task (see Figure 1).



Eight basic flight manoeuvres represent the highest level of the hierarchy: straight and level flight, straight climb, straight descent, level turn, climbing turn, descending turn, take-off, and landing. A ninth

manoeuvre category was formed for data segments taking place just before and after the occurrence of a side task in session 5.

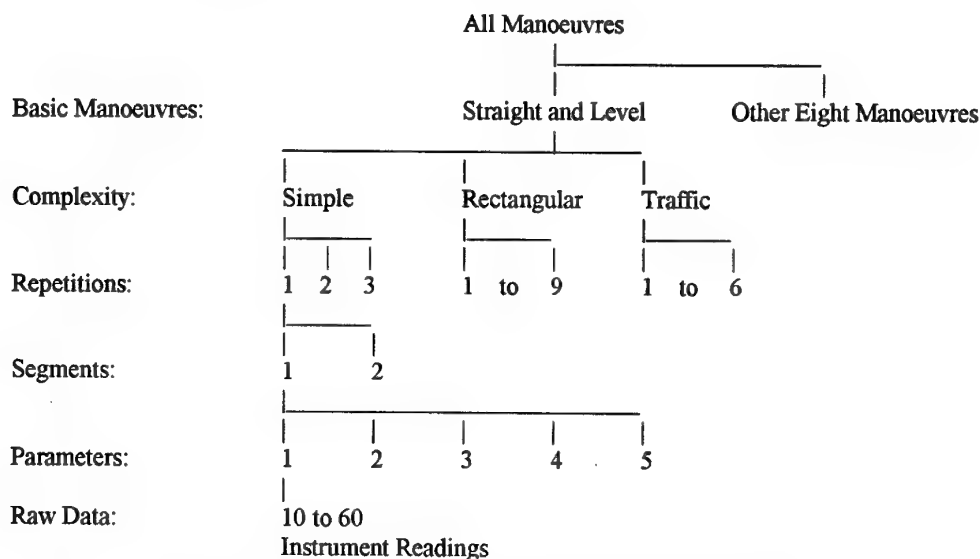


Figure 1. Hierarchical Structure for Straight and Level Flight, from Spinner, 1990

#### Summary Measures

The following description of the development and intended meaning of the SMs is taken from Spinner, 1989 and 1990.

"The formation of SMs had the goal of transforming the raw data into meaningful variables that represent the candidates' operation of the simulator over a specified period of time. The raw data that are provided by CAPSS consist of instrument readings (e.g., compass headings) taken twice per second. In this form, the data represent the state of the simulator, but do not indicate the candidate's proficiency in operating it. It is only when these readings are transformed into SMs that meaningful information about the candidate's ability may be obtained. It is these SMs that were used as predictors in analyzing the candidates' performance in flying training (Spinner, 1990, pp. 6-7)."

"Many of these SMs rely upon reference to the command level (CL), which is the target value for the parameter (e.g., the required heading or altitude). Other SMs refer to warnings which occur as the candidate deviates more and more from the CL: anticipatory warnings (first level), out-of-tolerance warnings (second level), and crash preventions which cause the simulator to freeze and reset (Spinner, 1989, p. 12)."

"The SMs were devised specifically for this project based upon previous empirical literature, the

expert opinions of CF flight instructors and flight crew, and the author's insights gained from operation of CAPSS and flying experience. The SMs were designed to assess:

- accuracy in keeping flight instruments on target;
- variability in performance;
- speed in response to errors and warnings;
- smoothness of operation and avoidance of overcorrections and abrupt movements;
- coordination of the flight controls, and
- number of instances, and amount of time spent flying towards or away from the command level... (Spinner, 1990, p. 7)"

The main study which led to the present CAPSS equation was the prediction of candidate flying training performance in Primary Flight Training (PFT) and in Basic Flight Training (BFT) or Rotary Wing Training (RWT; Spinner, 1990). Spinner used the flying training results of a sample of 309 male anglophone pilot candidates who had already been selected for pilot training by the aircrew selection tests then in place. For this sample, 62.1% passed PFT, and of those, 76.6% passed BFT or RWT. The criterion used in the study was success or failure in flying training. Each candidate was assigned to one of four groups:



- a. candidates who failed PFT;
- b. candidate who passed PFT and failed BFT;
- c. candidates who passed both PFT and BFT, and;
- d. candidates who passed both PFT and RWT (none of the candidates in the sample failed RWT).

Equations predicting flying training outcome were developed for each of the five CAPSS sessions through discriminant analysis using a four group criterion (fail PFT, fail BFT, pass BFT, pass RWT). Each session's equations were based on three discriminant functions. The best discrimination was between those who failed PFT and those who passed PFT, and most of this information was derived from Hour 1. Hours 2 through 5 added relatively more discrimination between those who failed BFT and those who passed advanced flying training (BFT or RWT).

These equations were used to generate each candidate's predicted probability of passing flying training. The classification results for each equation were then computed. Using Hour 5 results showed CAPSS to have an overall correct prediction rate of 81.9%. The percentage of candidates selected by

CAPSS that actually passed at PFT and BFT/RWT were 89.9% and 83.9% respectively. The loss rate (the percentage of candidates who passed flying training that were rejected by CAPSS) was 8.2%. This result was compared to the system that was actually used to select the candidates: a pass rate of 62.1% at PFT and 76.6% at BFT. However, the author notes that these results are inflated due to the use of stepwise procedures in developing the equation and applying them to the sample that generated them. A final analysis was to examine the effect of basing selection decisions on fewer than five sessions. The classification results indicate that gains in prediction accuracy were made until the fourth session, and that the fifth session added little to prediction with this sample. In practice, only four sessions are used in pilot selection, and the fifth session is not used.

Spinner (1996) performed a cross-validation of CAPSS using a sample of 110 male anglophone pilot candidates. The best discrimination between those who passed flying training and those who failed occurred with Hour 4 results. The classification decisions compared to actual results are reported in Table 2. The author notes that the CAPSS pass predictions are still higher than the unusually low failure rate for this sample in comparison to the historical rate.

Table 2. CAPSS predictive accuracy

	Pass Rate <sup>1</sup>	Loss Rate <sup>2</sup>	Overall Correct Predictions <sup>3</sup>
Hour 1	84.2% (64/76)	27.3% (24/88)	67.3% (74/110)
Hour 2	88.7% (63/71)	28.4% (25/88)	70.0% (77/110)
Hour 3	87.5% (63/72)	28.4% (25/88)	69.1% (76/110)
Hour 4	89.2% (66/74)	25.0% (22/88)	72.7% (80/110)
Hour 5	85.5% (65/76)	26.1% (23/88)	69.1% (76/110)
Previous System:			
Current Sample	80.0% (88/110)	unknown	unknown
Previous System:			
Historical Rate	55%	57%	unknown

Notes:

1. The pass rate is the number of candidates who were correctly predicted to pass flying training, relative to the total number who were predicted to pass (i.e. of those predicted to pass, the number who actually did pass).

2. The loss rate is the number of candidates who actually passed flying training but who were predicted to fail.

3. The overall percent correct is the number of candidates correctly predicted to either pass or fail, relative to the total number of candidates.

Table 3. CAPSS scores and gender – all candidates

Female				Male			
Session	Mean	SD	N	Session	Mean	SD	N
Hour 1	0.543	0.219	69	Hour 1	0.649	0.228	524
Hour 2	0.513	0.271	63	Hour 2	0.612	0.250	492
Hour 3	0.466	0.241	20	Hour 3	0.604	0.287	175
Hour 4	0.494	0.348	20	Hour 4	0.527	0.308	175

Pelchat (1999) reported the demographic characteristics of a sample of 756 candidates assessed using CAPSS since its introduction as the pilot selection in February, 1997. During the implementation of CAPSS, candidates were only tested to Hour 2; in the sample reported by Pelchat, only 207 candidates completed all four sessions. No significant differences were found between the performance of Anglophone and Francophone candidates, however, gender differences in performance were apparent. Table 3 reports the mean scores obtained by males and females for each of the sessions. CAPSS scores are reported as a probability of passing flying training; the cutoff is a score of 0.7 in

Hour 4. While males performed better overall, male applicants were significantly more likely to have previous flying experience (PFE) than female candidates. Only 24% of the females had PFE, compared with 42% of the males, while 32% of the males had over 50 hours and almost 20% had over 100 hours, compared to nine and three percent, respectively, for the females. The results of males and females with no PFE (Table 4) are similar. As of 1 December, 1998, there were only 29 candidates who had attempted PFT and just five who had attempted BFT. These candidates were processed with two CAPSS sessions, using a CAPSS cut off of 0.5. For PFT, 27 candidates passed, one failed flying, and one was recoured, for an overall 93% success rate.

Table 4. CAPSS scores and gender – no PFE

Female				Male			
Session	Mean	SD	N	Session	Mean	SD	N
Hour 1	0.540	0.207	44	Hour 1	0.547	0.232	233
Hour 2	0.494	0.279	38	Hour 2	0.494	0.246	222
Hour 3			7	Hour 3	0.441	0.242	57
Hour 4			7	Hour 4	0.385	0.258	57

### Strengths and Weaknesses

The main strength of CAPSS is that it is a work sample of the complex skills needed to fly an aircraft. In selecting pilots, a range of important skills can be identified and measured by a variety of tests; the advantage of CAPSS is that it measures these skills simultaneously, just as the skills would be used in actual flying.

The main weakness of CAPSS is that it is not an easy system to modify. The CAPSS predictive equation was derived based on a sample of pilot candidates following a specific training programme, using specific aircraft. The effects of changing the training or the introduction of new training aircraft cannot be readily determined. Insofar as CAPSS measures the "right stuff" required to become a pilot, it should be relatively immune to these changes. In the CF, validation of CAPSS, or any pilot selection system, is difficult because of the small number of pilots that are trained. This effect is doubled for CAPSS because it uses performance results to derive the equations. With other systems, it may be possible to simply tweak cutoff scores within a battery of tests; the development

of CAPSS equations is a statistically complex procedure.

### References

Pelchat, D.W. (1999). Analysis of the Canadian Automated Pilot Selection System (CAPSS): Findings from the first two years of operation. Sponsor Research Report 99-12. Ottawa, Ontario: Director Human Resources Research and Evaluation.

Spinner, B. (1988a). A plan for the reduction of the CAPSS predictor data. Technical Note 12/88. Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

Spinner, B. (1988b). Using the Canadian Automated Pilot Selection system to predict performance in Primary Flying Training: Straight and level flight. Technical Note 15/88. Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

Spinner, B. (1989). Using the Canadian Automated Pilot Selection System to predict performance in Primary Flying School: Derivation and cross-validation. Working Paper 89-9. Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

Spinner, B. (1990). Predicting success in Basic Flying Training from the Canadian Automated Pilot Selection System. Working Paper 90-6. Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

Spinner, B. (1996). The Canadian Automated Pilot Selection System (CAPSS): Predicting success in Basic Flying Training - Cross-validation results. Sponsor Research Report 96-3. Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

# Difficulties in Accessing a Representative Pilot Force: The Demographic Challenge and Views of Minority Pilot Focus Groups

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## Summary

The United States Air Force has expressed concern about under representation of minority officers in its pilot force. Historically, there have been relatively smaller percentages of African-American and Hispanic officers among Air Force pilots than might be expected from other demographic and educational data. As part of a more general study of demographic trends and their effects on the Air Force personnel system, researchers were tasked to gather information pertaining to minority community attitudes about the military and flying careers. The researchers gathered this information from focus group interview sessions among African-American and Hispanic pilots and pilot trainees and from Air Force Academy and Air Force Reserve Officer Training Corps (AFROTC) minority recruiters. The responses highlight reasons for the lack of interest in flying careers among the most competitive minority students. They also offer suggestions for enhancing the selection/recruitment and training processes to attract a greater percentage of the highly qualified minority students and allow them to compete

successfully for pilot positions. This paper presents a brief summary of that report (Barucky, 1998).

## I. Background: A Concern About Pilot Demographics

An ongoing concern of Air Force personnel managers is to ensure that the Air Force officer corps is representative of the racial and ethnic makeup of the country. For many years the ethnic and racial mix in the enlisted force has been such that minorities, especially members of the African-American community, have been adequately represented. While representation among the officer corps has not reflected the percentages of minorities within the population at large, it has been representative of the percentages of minorities among college graduates. As a college degree is a prerequisite for commissioned service, the Air Force has tried to ensure that it was getting its fair share of that somewhat smaller, but growing, pool of talent. As shown in Figure 1, the officer accessions for most of the 1990s have reflected that effort, as approximately 10 to 18

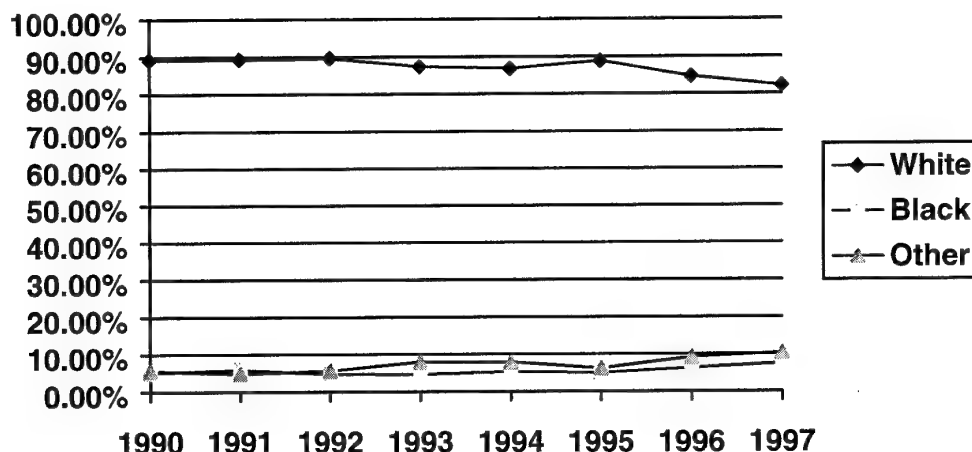


Figure 1. Percentages of white, black, and other minority officer accessions, 1990-97

percent of the officer corps has been made up of minority members. And, more specifically, the African-American representation has consistently been about 6 to 8 percent, a number that has reflected the percentage of African Americans among college graduates in the age-eligible group.

Although these numbers indicate the Air Force has been able to maintain its representative portion of the minority college graduate population, there has been one area in which the representation of minority officers has prompted some concern, and that is within the rated officer force, primarily among those officers attaining the pilot rating. As a substantial portion of the top leadership positions in the Air Force have traditionally been held by pilots, a disparity in minority representation among this group has posed some concern throughout the 1990s. Figure 2 displays the percentage of African-American pilots from 1990 to 97, and it indicates that they generally have made up less than 2 percent of the pilot force. Hispanic pilot representation has also been between 1 to 2 percent. The continuance of these small minority pilot percentages is illustrated most clearly in Figure 3, which shows the minority pilot percentages for September, 1999.

### **The Proposed Study**

Air Force planners' concerns with the relatively small percentages of African-American and Hispanic officers among Air Force pilots and a perceived difficulty in attracting highly qualified minorities into Air Force flying programs resulted in a request for focus group research to determine minority groups' attitudes about pursuing a flying career. This effort was an extension to a 1997 study of the effect of future demographic and socio-economic trends on the Air Force personnel system by Stone, Turner, and Looper (1997), and was to provide insights regarding African-American perceptions and attitudes about, and motivation toward, military service and an Air Force flying career.

The focus group sessions were designed to accomplish four objectives:

- (1) determine minority attitudes about an Air Force officer career
- (2) determine minority attitudes about a flying career

- (3) identify potential obstacles to recruitment and development of minority pilots
- (4) elicit recommendations for improving minority interest/participation in Air Force flying careers.

### **The Subjects**

To gather these data within a relatively short time frame, the researchers were asked to complete small-group interview sessions among African-American and Hispanic pilots or pilot trainees as well as among US Air Force Academy (USAF) and Air Force Reserve Officer Training Corps (AFROTC) minority recruiters, who interacted frequently with members of minority communities, providing information and guidance to potential candidates for those two officer commissioning programs. A total of 38 subjects, both civilian and military, participated in the formal, small-group sessions conducted at three Air Force bases (AFBs), the USAF Academy, and a civilian university flying program. A summary of the background of the total sample is included at Table 1. Near the end of the study, after focus group data had been compiled, additional information was gathered from representatives of public and private agencies and aviation-related professional organizations providing aviation awareness education to minority communities. Included among this group were the following organizations:

- National Coalition for Aviation Education organizations (e.g., Aircraft Owners and Pilots Association or the Experimental Aircraft Association)
- National Aviation and Space Education Alliance
- Federal Aviation Administration Aviation Career Education ("ACE") Camps
- National Aeronautics and Space Administration (NASA) Education Programs
- Organization of Black Airline Pilots
- Minority Aviation Education Association
- Icarus Foundation
- Jackson Foundation
- Delaware Aerospace Education Foundation
- Tuskegee Airman, Inc.

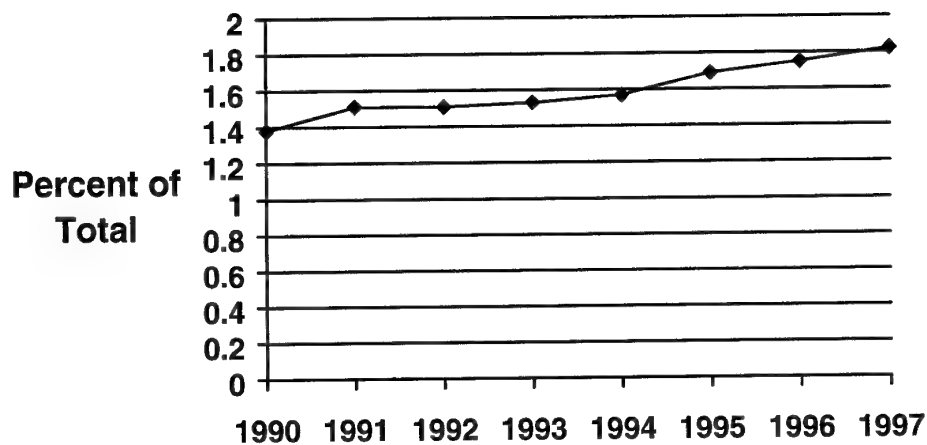


Figure 2. Percentage of African-American pilots in USAF pilot force

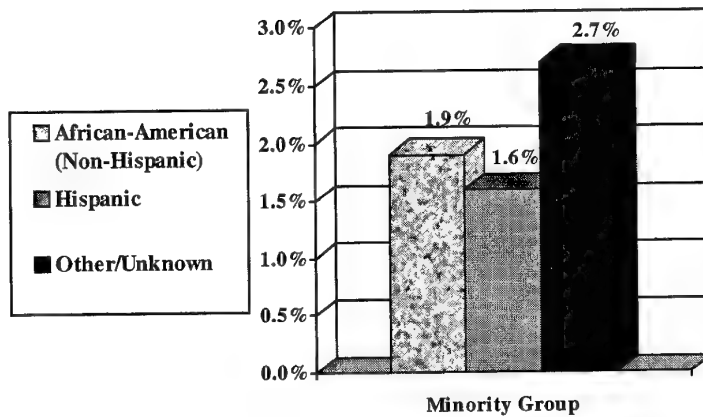


Figure 3: Percentage minorities in USAF pilot force (September 1999)

Table 1. Demographic make-up for focus groups

Racial/Ethnic Status						
Focus Group	Total Number in Group	African-American	Hispanic	Caucasian	Asian-American	Female
AFROTC Recruiters	7	6	0	1	0	0
USAFA Recruiters	7	6	1	0	0	2
Laughlin AFB Student Pilots	11	3	3	0	0	2
Laughlin AFB Instructor Pilots		4	1	0	0	
Luke AFB F-16 Pilots	5	5	0	0	0	0
Delaware State U. Student Pilots	8	5	0	0	1	2
Delaware State U. Graduate Pilots		2	0	0	0	
Total	38	31	5	1	1	6

## II. The Focus Group Methodology

In each session the interviewers gathered background information about the participants, asked them to comment on their own experiences and interest in a flying career, and solicited their impressions of the perceptions of minorities in the communities they were familiar with, regarding a flying career. More specifically, the discussions were structured to elicit their impressions about:

- (1) minority members' interest in and motivation toward a military, and especially an Air Force, career.
- (2) minority members' interest in and motivation toward pursuing a flying career.
- (3) minorities' perceptions of their ability to qualify for an Air Force aviation position.
- (4) factors which affected their own decisions to become an Air Force aviator.
- (5) the current attitudes of the experienced Air Force pilots toward military life and a flying career.
- (6) recommendations for improving minority attitudes/interest in an Air Force flying career.

The method of collecting the focus group data was primarily through structured small-group interview sessions. The meetings with active duty pilots or pilot trainees, at Laughlin and Luke AFBs, were conducted face-to-face by one interviewer, while at Delaware State University, three researchers were involved in the face-to-face data gathering with civilian student pilots, recent graduates, and instructors. Two of the group interviews (USAFA and AFROTC recruiters) were conducted by telephone conferencing, with three members of the research team present to solicit and record responses. Although the same interviewers were not present at each session, a basic set of initial questions was used to ensure a common framework for the data collection. After each session, interviewers' notes were used to create a summary of the impressions from that group. To ensure accuracy of the interviewers' perceptions, the summary was sent to the session members for a review. In addition to the focus group responses, the information gathered from aviation awareness programs was obtained through individual telephone interviews with more than two dozen representatives across twenty programs.

## III. Findings

### Consistency of Responses

The results from the focus group sessions are expressed as summaries of the participants' impressions regarding the primary questions addressed. Even though these impressions were gathered by differing and multiple interviewers from somewhat diverse subjects in five different groups, the researchers found a great degree of similarity among the responses. As described above, interview subjects included experienced military pilots, military student pilots, civilian aviation students from a variety of backgrounds, and young, recently commissioned officers in temporary recruiting assignments. Yet these independent focus group participants tended to offer very similar views about the interest in the military and in an aviation career that they perceive among the members of the minority communities with whom they interact. In addition, the principal researcher had conducted a similar inquiry among groups from minority communities in 1990-91. Those responses were also quite consistent with the responses from the current study.

### Minority Perceptions About Military Careers

#### Top Minority Students Show Little Interest in a Military Career

Although perceptions differ somewhat among different segments of the population, in general, focus group members indicated that minority students from more affluent backgrounds and those with exceptional educational records - those most eligible for military scholarship programs - are least interested in military opportunities. Unfortunately, when the competition for selection to pilot training slots is greatest, it is these top students that are most likely to compete successfully for those slots. Not surprisingly, there seems to be more interest among competitive students from career military families or in locations near military bases. But among those with less direct ties, a military career is described as the "last choice" for college-eligible minority students. And, as indicated in the next section, these top students are highly sought by many sources, and they often have exceptional opportunities offered from educational institutions and public and private entities.

### **Many Other Options Available for Highly Competitive Minority Youth**

The USAFA and AFROTC focus groups indicated that they face great competition for highly regarded minority students. They suggested that those students, even if interested in aviation, have many options open to them. Large public and private academic institutions, corporations, and even other government agencies are willing to provide incentives to attract top minority students. Many of the nations' top schools offer attractive scholarship programs equal to the free education provided by the USAFA or AFROTC; and they require no service commitment, leaving the students free to choose any opportunities offered upon completion of college. They also have active placement programs to ensure that those students get plenty of exposure for jobs in the public and private sector.

Both corporations and public agencies have aggressive recruitment programs targeted at highly qualified minorities. They have developed strong ties with colleges, not only with the placement offices, but also with individual academic departments, offering attractive internship opportunities and potential jobs with no strings attached after graduation. The project researchers discovered numerous examples of corporate recruitment programs aimed at attracting top minority youth. And in some cases, the corporate programs begin their talent search well before the students have entered college.

In addition to the immediate opportunity for a high-paying job with a top corporation or firm, the most highly qualified minority students also may have offers of scholarships to graduate schools or access to law or medical school programs. Thus, from their high school years through college, the minority students most qualified to become flying officers also have the greatest array of opportunities other than the Air Force, are most in demand, and are, therefore, the hardest to attract with financial/scholarship options.

### **Interested Minority Students Express an Affinity for Enlisted Army Careers**

Among minority communities, a military career is deemed more appropriate for vocationally oriented youth, and the focus group members indicated that this minority subgroup expresses more affinity for enlisted career options and for the Army as their service of choice. In fact, several of the groups

reported that many of the youth they encounter don't really perceive much difference among the various branches of the military and tend to picture "a military career" in terms of the Army combat arms image that they see advertised in the media or portrayed, somewhat unflatteringly, in movies.

### **Some Aspects of the Military Are Seen in a Negative Light in Minority Communities**

Focus group members suggested that many minorities view aspects of military life from a very negative perspective. They see it as a restrictive, dangerous lifestyle in which personal freedom and choices are severely limited. In some cases these attitudes are engendered by parents/grandparents who carry a negative impression based on long-held anti-war sentiments and experiences from the Vietnam era. Some minority community members have articulated their perceptions that the military treats minorities poorly and that the military epitomizes the restrictions and lack of freedom, a position of subordination to "the Man," that minorities have been fighting to overcome for decades. In addition, for many parents, the military is (appropriately) associated with physical danger and with the taking of lives, situations they would prefer to have their children avoid. Finally, for persons from Hispanic cultures, the prolonged family separation that comes with continuous worldwide assignment is an aspect of the military career that is considered a distinct drawback.

Among some of the youth, the aspects of physical danger and even of travel can be somewhat enticing; but the greatest fear for them is length of commitment. For a majority of today's eligible students, the prospect of being locked into a situation for four years, of being unable to just quit if the lifestyle is not to their liking, is repeatedly identified as a major deterrent to enrolling in an officer commissioning program. As several focus groups indicated, to 17-year-old students, four years at the Academy and another five years of active duty seems like a commitment for the rest of their lives.

### **Minority Interest in Flying Careers**

#### **Lack of Interest in Flying Careers Linked to Unfamiliarity with Flying and Aviation**

The minority communities' lack of familiarity with aviation in general, and specifically with flying careers, was the factor most consistently stressed



throughout the interview sessions. Most of the focus group participants indicated that their early experiences with flying and their interest in a flying career were considered to be relatively unusual by their friends and other minority community members. And yet, the importance of such experience was made clear by most of the pilots interviewed. Three quarters of the pilots or student pilots could point to some personal flying experiences or aviation-related interests (e.g., model building) that imbued them with "the flying bug," generally at a relatively early age. In contrast, a large percentage of minorities have had little involvement with flying in their childhood. The focus groups indicated that fewer inner city youth and fewer youth from modest rural backgrounds have flown commercially, have visited airports, or have any contact with someone who is associated with an aviation career. They have little knowledge of pilot requirements or lifestyle and are quite unaware of the thrill of flight that attracts people to that occupation.

### **A Flying Career is Viewed as Too Dangerous**

In their interactions with some minority youth, the focus group members found that the youths' strongest perception of a flying career was that it is a dangerous and undesirable activity. In fact many of the focus group pilots reported a common reaction from their own friends and relatives when they first expressed a desire to fly: that "they were nuts" for wanting to pursue a career that could kill them. For those minorities with no aviation-related experiences, the major perceptions about flying come from movies or television. Unfortunately, the media portrayal of a flying career shows predominantly Caucasian pilots and usually in a dramatic situation involving accidents or near crises.

### **Few Role Models and Little Association of Flying with Minorities**

Even with the proud tradition of the Tuskegee Airmen (members of all-African-American flying units that operated so successfully in World War II), few minority members are able to identify minority role models from aviation career fields. Focus group members suggested that most minorities view a flying career as one of those activities that persons of color "don't do." There have been so few role models and little access to opportunities that most minority youth can not picture themselves in that situation. For those who might express some interest, the predominant

feeling is that a flying career is something too difficult to attain: one has to be extremely intelligent or wealthy, or both. And few minorities have had personal contact with, or knowledge of, aviation professionals in their communities. In contrast, many members of African-American or Hispanic communities have some interaction with or awareness of minorities who have been successful doctors, attorneys, clergymen, or businessmen. And, of course, minority doctors and lawyers are readily visible as characters in television shows. Thus, the focus group members suggested that successful African-American students were far more likely to see themselves completing law school or medical school than becoming a pilot.

### **Minorities Express Regard for Commercial/Military Pilots**

Although minorities express little interest in flying careers for themselves, the pilots in the focus groups indicated they personally encounter a great deal of respect among minority community members. The fighter pilots said they are afforded this respect for having achieved an unusual, difficult, and highly skilled position. Commercial airline pilots are also held in high regard for the responsibility associated with their profession. However, without much information about aviation careers, most minority youth think of the minority pilots as rare exceptions and an aviation career as unattainable for themselves.

### **Perceptions About Minorities' Qualifications for Flying**

#### **Interested and Qualified Minorities Do Not Compete Well in the Selection Process**

Another concern addressed by the focus groups was the impression among minorities (and even among the small pool of minorities interested in flying,) that they do not compete as well in the selection process. The focus group participants themselves believe that, when the number of pilot accessions is lower and the competition for pilot slots becomes greater, minorities do not seem to compete as well for selection. And some participants suggested that a group of potentially capable minority pilots might be lost in the selection process. In fact, some studies (Cartagena, et al, 1997) indicate that, on the criteria used by pilot selection boards (e.g., Air Force Officer Qualifying Test (AFOQT) scores, grade point

average, flying experience), minority applicants, on average, tended to have lower scores. Thus, a major challenge for recruiting minority pilots is not only to increase interest in flying careers among minority youth, but to increase interest among the group of minority youth who are likely to be most competitive.

### **Some Non-selected Minority Candidates Might Make Successful Pilots**

A number of the focus group participants indicated that, among the pool of interested and non-selected minority pilot candidates, there are some who would make successful pilots if they had met the pilot selection board in a less-competitive year or if they had the advantage of private flying experience that other candidates had. Their rationale was that there is (or ought to be) a point at which the selection criteria indicate a high probability for successful completion of flying training. They conjectured that, beyond this point, higher grade point average or higher AFOQT scores might add little predictive power, but these higher scores may still be used as a deciding factor among well-qualified candidates. They suggested that, in low accession years, there are minority candidates who attain that criterion level but whose selection scores are still not high enough, among the applicant pool, to rate selection for the limited number of training slots. And yet, in a year in which pilot accessions are larger, the same scores might have resulted in selection. The focus group members realized that this situation affects non-minority applicants as well. And they were adamantly against lowering standards to select poorly qualified minorities. But they expressed a strong belief that, among the current small group of interested and qualified minorities, there may be some unfortunately ill-timed applicants who could have been very successful pilots but were not selected. To the focus groups this represents a lost resource for the Air Force. Moreover, some focus group members suggested that the continued non-selection of minority members who are interested in flying and who seem capable but are not selected may serve to reinforce the impression that a flying career is less attainable for all minorities.

Members of one of the instructor pilot focus groups expressed a belief that minorities' lack of flying experience could be linked to performance on the flying-related portions of the AFOQT. They suggested that a person who had previous flying hours would score better on that test than someone

without that additional experience. And they expressed an opinion that fewer of the minority candidates would have the resources to pay for those additional flying hours that might make the difference in their selection scores. Thus, they suggested that some of those interested but non-selected candidates might have been more competitive in the selection process and would actually have made successful pilots if they had had the resources to obtain the training needed for selection.

### **Other Obstacles to the Recruitment of Qualified/Interested Minorities**

In addition to the competition from attractive alternatives, focus group members identified a number of other obstacles that may have hindered the ability to attract interested and highly qualified minority candidates.

#### **Potentially Interested Youth May Have Difficulty Obtaining Information**

For some potentially interested students, the usual sources of career information, family, friends and school, are ineffective for learning more about an Air Force flying career. Most parents and family members in minority communities also lack knowledge about the Air Force and about the lifestyle of a flying officer. In other cases the family members are fearful of the danger and separation they associate with the military and will discourage interest in becoming an Air Force pilot. Some school counselors are more familiar with enlisted occupations and lack knowledge about the life of a flying officer or flying careers in general. USAFA and AFROTC focus group members suggested that some counselors or teachers harbor anti-military sentiments and will discourage potential highly competitive applicants from investigating a military career.

#### **Completing the Application Process is Difficult**

Several of the focus group members related horror stories about how they almost missed the opportunity to attend USAFA or AFROTC because they had difficulty with the application process and nearly gave up. Often the minority students are the first in their families to attend college, and their parents are not able to provide much help in completing the paperwork and procedures for obtaining an Academy nomination or an AFROTC scholarship. Unless school

counselors can assist, some viable, interested candidates may become discouraged by the paperwork demands of AFROTC or USAFA procedures.

### **Obstacles Facing Minorities in Undergraduate Pilot Training (UPT)**

The instructor pilots and students in flying training discussed the fact that minorities who are motivated to fly and ultimately are selected for undergraduate pilot training still face special factors which may make it more difficult to complete the program. They restated the belief that a large percentage of minorities entered UPT with less flying experience than their non-minority counterparts. From their perspective, this translated into less confidence and greater stress. Additional stress came from having only one or two minority students in a class. They recalled that, when they were in those situations, they perceived themselves as representing their race, and that each mistake or setback was magnified. Moreover, they felt they had less of a close support group among their classmates in which to confide and share their apprehensions.

### **Recommendations for Increasing the Number of Minority Pilots**

The focus groups had several suggestions for increasing the number of minority members selected for and successfully completing flying training. Very few of their suggestions focused on changing the selection criteria. Rather, they centered on planting that essential "flying bug" in the group of highly qualified minority youth most likely to be competitive for selection. They emphasized that that desire to fly, once engendered and nurtured, could help offset the lure of more financially attractive professions that currently attract the most highly qualified minority students. They also stressed increasing aviation familiarity and interest in an Air Force flying career among minority youth in general by expanding opportunities for visits to aviation facilities and hands-on flying-related experiences and by increasing awareness of successful minority aviators. They recommended ensuring that those motivated to fly have a higher probability of succeeding by encouraging better educational preparation early in schooling and by providing access to flying experiences that lead to greater success on pilot selection criteria and in initial

pilot training. They emphasized that most of their ideas were not quick-fix solutions, but were long-term initiatives aimed at changing cultural attitudes and broadening the base of interested and well-prepared candidates. These recommendations were reinforced by the views of the representatives from aviation-related agencies and professional organizations, many of whom are engaged in just the types of aviation awareness and education activities prescribed by the focus group members.

### **IV. Conclusions**

The views expressed by the focus group members, regarding the attitudes of minority groups toward a military career and a flying career, proved to be very consistent and not particularly flattering. Those views clearly imply a lack of interest in a career as a military officer, especially for the most qualified students, and very little motivation to pursue a flying career. The rationale for the feelings about the military career tends to result from both a distrust of the military as a somewhat dangerous and restrictive institution, which does not treat minorities particularly well, and from a feeling that, currently, well-qualified minority students have more promising and lucrative options in other occupations, without the requirement of a multi-year commitment.

The lack of interest in a flying career stems more from minorities' unfamiliarity with aviation in general, a lack of knowledge about a pilot's lifestyle, the scarcity of minority role models in aviation careers, and a perception that minorities are not likely to attain the credentials for this challenging and dangerous occupation.

For those minorities who are interested in an Air Force flying career, the focus groups reported obstacles in applying for the officer programs, perceived difficulties in competing for selection to UPT (due, partially, to less prior flying experience), and pointed to the added difficulties perceived by the small number of minorities trying to complete Undergraduate Pilot Training.

Nearly all the pilots interviewed described their early interest in aviation, spurred by some event or experiences that were unlike the experiences of most of their minority counterparts. To remedy this situation and increase the interest in a military flying career among minority youth, the focus groups prescribed a vigorous program of

advertising and experiences designed to increase the awareness of minorities about the desirable aspects of an Air Force flying career. Given the lucrative opportunities available to highly qualified minority students, the focus group members were doubtful that the Air Force will be able to generate sufficient interest in the short term, without extremely generous financial incentives to high school seniors or college students. They emphasized instead the need to effect a shift in attitudes about flying, by getting minority community members more direct experience with the world of aviation and especially by initiating community programs which will introduce minority youth to flying and get them "bitten by the flying bug." They also stressed the need to get minority pilots into these communities as role models, to remind the youth of the Tuskegee Airmen and other successful minority aviators, and to demonstrate that a flying career is something that is attainable. Finally, the focus groups provided suggestions for eliminating some of the institutional obstacles that hinder those minorities who are interested in a flying career from reaching their goals.

The groups expressed confidence that, with the right initiatives, the perceptions of minorities can be changed and that more, highly competitive and better prepared minority youth could be motivated to attain their wings as an Air Force pilot. With these increased numbers, a greater percentage of minorities should be able to compete successfully in the selection and training processes. However, the pilots were less sanguine about the ability to accomplish this objective in a short time frame. They suggested that a long-term, grass-roots solution is going to have to be implemented before the problems are resolved.

## V. References

Barucky, J.M. (1998). Effect of future demographic and socioeconomic trends on the Air Force personnel system: Minority pilot focus group study. Informal Technical Report under F41624-95-D-5030. Brooks AFB, TX: Human Resources Directorate, Armstrong Laboratory.

Cartagena, S. M., Stone, B., Fast, J., Zelenski, W.E., & Weeks, J. (1997). Improvement of the integrated decision modeling system and application to flying training candidate selection. Technical Report under F41624-95-5030.

Brooks AFB, TX: Human Resources Directorate, Armstrong Laboratory.

Stone, B. M., Turner, K. A., and Looper, L. (1997). Effect of future demographic trends on the Air Force personnel system. Paper presented at the 37<sup>th</sup> Annual Conference of the International Military Testing Association, Sidney, Australia.

# Officer and Pilot Selection System in Turkish Air Force

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## Abstract

In contrast to expectations, with the pace of developing technology, the human factor has become one of the most important elements in the organizations. Especially, in complex systems, like aviation, the human factor is even more critical. The fact that the cause of 80% of flight accidents in the last 40 years is related to human factor underlines the importance of human factor in this area.

According to the current laws, the aim of the Turkish Air Force Academy (TAFA) is to produce pilot candidate officers. In other words, all officers are aimed to be trained as pilots. Therefore, the officer selection system and pilot selection system is organized in an integrated way. In order to accomplish this critical mission, Turkish Air Force that has always been conscious of the importance of human factor has already developed a complex and multi-staged selection system for Turkish Air Force Academy.

The first step of the system is national university entrance test. The election system also includes medical check-up, physical fitness test, various ability and personality tests, three different interviews. The candidates, who succeed to pass these stages, fly a propeller-training plane for 14 hours. At the end of this training, the successful candidates take basic military training. The candidates achieve to pass all the stages successfully can be a student in the Academy. In this paper, the details of this integrated selection system are introduced and the recent improvements in the system are explained.

## Introduction

Aviation technology has been rapidly improved since the first successful take off an engine powered aircraft, and developments in recent years accelerated to a large extent. The number of aircraft passengers only in the United States increased approximately 20 times from 2,532,000 in 1960 to 48,049,000 in 1996 (Air Carrier Profile, 1999). One of the most important concerns of this thriving aviation sector is to minimize aircraft accidents and provide flight safety. According to statistical data for the past 40 years, 80% of aircraft accidents

involved the human factor (Aircraft Accidents, 1998). The core of the human factor in aviation is pilot, and therefore pilot selection is the most crucial element.

Costs represent the important component of pilot selection process. An F-16 jet fighter costs approximately US\$ 22.5 million in 1997 (THK Maliyet Analizi Kitapçığı, 1997). The training of a pilot who is responsible for flying such an expensive piece of war effectively and safely costs approximately GBP 3,000,000 (Turnbull GJ, 1992). The selection of the personnel to fly such a costly device after a high-priced training is certainly critical.

According to the current laws, the aim of the Turkish Air Force Academy (TAFA) is to produce pilot candidate officers. In other words, all officers are aimed to be trained as pilots. Therefore, the officer selection and pilot selection systems are organized in an integrated way. So pilot selection system which is still very hard gets even more complicated. In order to accomplish this critical mission, Turkish Air Force that has always been conscious of the importance of human factor has already developed a complex and multi-staged selection system for Turkish Air Force Academy. In this paper, we will introduce these selection procedures. Firstly, a brief information about the history of selection process and Human Resources Selection and Management Center that organizes the student selections will be given. After that, the details of each selection phases will be explained.

## History

Turkish Air Force was built on 1st July 1911 and the first pilot candidates, Captain Feza and Lieutenant Kenan, were selected to be pilots by a special council. These candidates were sent to France to be trained as pilots. In this way, the pilot selection history in Turkish Air Force was started.

In the early days, a perfect pilot was defined as follows:

- To be healthy and to have perfect eyes,
- To be calm and to have good memory and attention,
- Not to speak in an exaggerated way,

- To be able to read map.

Undoubtedly, these characteristics have changed, while new planes and technologies have been developed. In those years, the main tools for selection were interviews, medical check-up, glider training and training flights. Only the candidates who could achieve all the stages could be accepted as a cadet (İKDM Tarihçesi, 1998).

In 1963, a new and important tool, intelligence test, was added into the selection system. In the same year physical fitness test was another important development for the pilot selection procedure.

In 1986, computerized pilot aptitude tests were integrated into the selection process. These tests, purchased from the British Royal Air Forces in 1986, assess the required flying aptitudes of the candidates. They have still been used in the current pilot selection system.

Up to 1982, student selection system was not organized by a special department. This duty was done by personnel chief of the Academy. However, in 1982, Enrolment Office was founded to organize and develop the student selection system. Finally, in 1991, this office was upgraded to Human Resources Selection and Management Center (HRSC) which is still organizing the student selections.

HRSC's main duty is to select the candidates who have high motivation and aptitude for being officer and pilot (İKDM Başkanlığı Görev Analizi, 1995). This center directly depends on Academy Commandant and it has three sub departments. These are public relations, interviews, and psychotechnic assessment.

The main goal of public relations is to give information to public and especially potential candidates, about Air Force Academy. In order to realize this goal, tours in the Academy are organized for the candidates or students of high schools. Moreover, posters and brochures that include information about Air Force and student selection system are delivered. These brochures are sent to all potential candidates. In addition to these, public relations are responsible for the TV programs and journal advertisements.

Interview department organizes three different interviews in order to select the fittest candidates. These interviews will be explained in the following sections. Another activity of interview department is to develop and find new interviewing techniques for selections.

Psychotechnic assessment department is responsible for assessment of the candidates with the help of the computerized aptitude tests. These tests are used to decide whether the candidate is appropriate to be a pilot. Surely, another duty of psychotechnic assessment department is to develop or provide new pilot aptitude tests.

Before getting into the details of selection procedures, it would be better to have a look at the student profile of Turkish Air Force Academy and the candidate sources.

### Student Profile of the Academy

In a complete personnel selection system, the profile of the desired personnel is one of the most important concepts.

The general objective of Academies is to produce regular officers who have had graduate level education according to the Service Academies Law and the Law of National Education. According to these laws, general profile of a regular officer is as follows:

- A mature personality and character that have been developed morally, physically and mentally,
- Acquired leadership qualities,
- Knowledge about military science, technical and social sciences,
- The ability to be a leader in the development of the Armed Forces according to the requirements of the age,
- The ability to follow the post graduate education and also the ability to comprehend the national and international problems in the light of Atatürk's principles.

The specific objective of the Air Force Academy is to produce pilot candidate regular officers who will be able to apply and improve the necessary tactical, technical and administrative activities. These officers are also expected to acquire basic orientation to perform further duties to match the current and future development pace of aviation and the Air Force (Air Force Missions and Objectives, 1999). Because of this special objective of TAFE, pilot aptitudes and aviation motivation must be added to the profile of an air officer.

An ideal TAFE cadet should have all these characteristics. The goal of all student selection procedures is to assess the candidates for these characteristics and to select the most appropriate ones.

## Candidate Sources

According to the current Academy law, the main candidate source of the Academy is military high schools. If the capacity of Air Force Academy can not be provided from the military high schools, high school graduates, male or female, can be candidates for TAFA.

Basically, all selection phases are processed in a standard manner, regardless of the source of candidates. However, there are some exceptions for this rule. All these details will be given in the following section.

## Selection Phases

There are many different forms of personnel selection phases in the organizations. However, most of the complete and successful selection systems can be formed in a standard way (Erdoğan İ., 1990). Figure 1 shows the graphic illustration of Air Force Academy Student Selection System according to that standard.

The candidates, who are successful in University Entrance Examination (UEE) and willing to attend the Academy, are required to fill an Application Form. If they are appropriate according to the Academy law, they are invited to the Academy for other selection phases. Firstly, initial medical check-up is applied to the candidates in order to determine the illness that can be inspected easily, for example baldness, stammer and etc. After that, tests and interviews are realized. At the last interview, a decision is given about the candidates, pass or fail. The successful candidates are sent to final medical check-up. The candidates who can take "Can Be A Military Cadet" report, go to Examination Flights. If candidate can also achieve this stage, they will take military training. And at the end, candidates who can pass all these stages can be cadets of the Academy.

As it was underlined that the selection phases for military high school oriented candidates and civilian high school candidates are not the same. Military high school candidates are exempt from some of the phases. Moreover, the sequence of the phases can be different. Table 1 shows the phases and sequence of the phases for each candidate sources.

Table 1. Selection phases for different candidate sources.

<b>Military High School</b>	<b>Civilian High School</b>
Application Form	UEE and Application Form
Final Medical Check-up	Initial Medical Check-up
Psychological Tests	Physical Fitness Test
Experimental Flights	Psychological Tests
	Interviews
	Experimental Flights
	Military Training

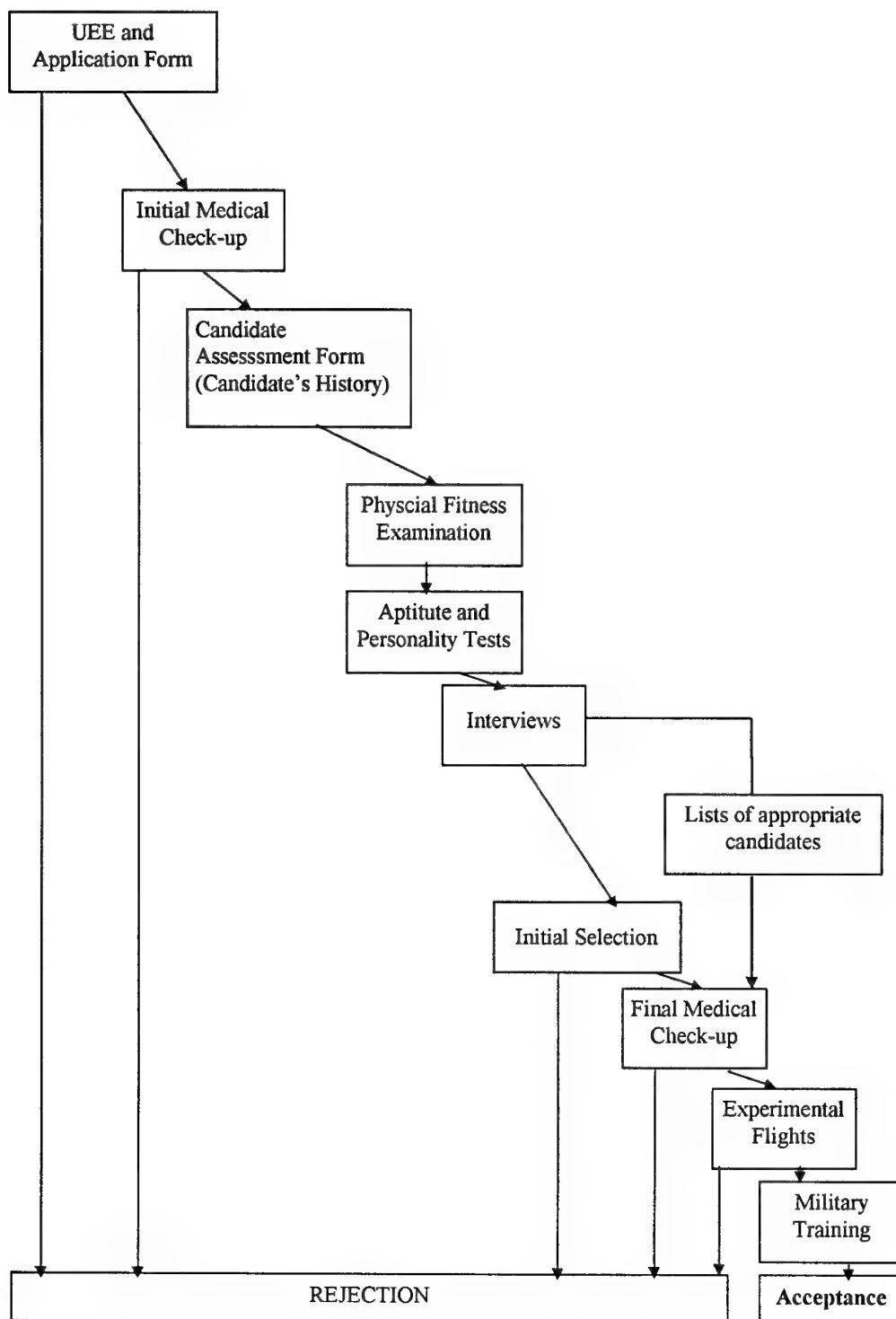


Figure 1. Turkish Air Force Academy Student Selection Procedure.



## University Entrance Examination (UEE) and Application Forms

There are many researches about the relationship between general ability and pilot aptitudes. Most of these show that the most significant measurement for predicting pilot training results is the general ability. In USAF, for example, AFOQT, which is aimed to measure general ability, is used to select air officers (AFOQT Information, 1998). In Turkey, UEE is used to measure general ability in TAFE student selection system.

In Turkish educational system, if a student wants to attend a university after high school graduation, he or she must take University Entrance Examination (UEE). More than 1.500.000 high school graduates take this exam each year. The students that want to attend TAFE must express his or her willingness, before the UEE.

The students who express willingness and whose points are higher than the point that has been announced by TAFE must fill initial an application form. In this form, we get information about the demographic characteristics of the candidate. In addition to this, a few more detailed pieces of information about the candidate are also included in this form, for example the height, weight etc. If all the conditions of the candidate are suitable for TAFE, s/he is invited to join TAFE for the selection phases.

### Initial Medical Check-up

The students, who can get the required point from the UEE, are invited to TAFE for other selection phases. The first selection phase in TAFE is initial medical check-up. The main aim of this check-up is basically economy and work saving. If there are some candidates who have disorders and abnormalities that can be inspected easily, determining their abnormalities earlier can save time and work.

In this medical check-up, candidates are examined to see if they have any disorders that can be easily determined, e.g. baldness, shortness, obesity, mouth disorders etc.

### Physical Fitness Test

The applicants that can pass initial check-up are tested with 400 meter run, long jump and push-ups. The candidates get a general grade according to their performances in these tests. Although there is no direct elimination at this test, the grades are taken into consideration at the last interview.

## Psychological Tests

There are three main tests which are used in the selection system. These are 16PF, Aircrew Aptitude Test (AAT) and Euro-NATO Portable Aptitude Test Battery (PORTABAT). The main aim of these tests is to measure personality and ability factors of the candidates. By the help of these measurements, comparison among candidates can be easier.

### 16 Personality Factors Questionnaire:

There are many researches indicating the relationship between personality and job performance. In most of the personnel selection systems, personality assessment is an important step. It is not so much different in aviation.

There are many tests that can assess the personality. However, only a few of them is frequently used in pilot selection system. The summary of the test which is used in pilot selection systems can be found in the report of Dolgin (Dolgin D.L., 1988). According to this report one of the most common personality test use for pilot selection is 16PF.

16PF is designed to make available information about an individual's standing on the majority of primary personality factors out of thirty or so covered by existing research on the total human sphere (Cattell R. B., Eber H. W., Tatsuoka M. M., 1970). In other words, this test is designed to model individual's whole personality characteristics with sixteen major factors. In TAFE student selection system, this test is used for getting information about candidate's personality before the interviews. The results of 16PF are sent to interview councils and these results are interpreted by the psychologist in the council. There is no direct elimination based on the results of 16PF.

### Aircrew Aptitude Test (AAT):

Since the formation of the first specific aptitude test battery for the pilots of the U.S. Air Force in between the years 1946-1947, these tests have become the most important instrument used for pilot selection. Although the use of the tests in the Air Force Academy selection system has been practiced for many years, computer-based aptitude tests are integrated in the system only in 1986. The test battery purchased from the British Royal Air Force is processed through validity and reliability studies, and reevaluated by the associated NATO work group to constitute the Turkish norms table (Bekmezci İ., 1999). There are three sub-tests in the battery: Sensory motor test, rapid perception test and instrument interpretation test. The raw scores

of the tests are converted to weighted scores following the Stanine (1-9) scoring system. To increase the predictive power of the battery, each test has been weighted differently. Raw scores are multiplied by the weights of each test, and the total battery score of the candidate is obtained by adding all scores up.

Up to 1998, the result of ATT is sent to interviews as data about candidates. After the correlation between test scores and pilot training results are constructed in 1998 (Bekmezci İ, Orman N.M., 1998), a new approach has been put into practice. The candidates get less than 80 points are eliminated.

### **Euro-NATO Portable Basic Attributes Test (PORTABAT):**

PORTABAT is a new test for measuring pilot aptitudes. It is produced as a result of Euro-NATO Aircrew Human Factors Working Group (AHFWG) meetings. This group is a multi-national group of appropriately qualified personnel and it is formed to advice and recommend to the Air Force Sub Group actions concerning aircrew selection, retention and crew resource management (Terms of Reference, 1997).

PORTABAT project was completed in 1992. However, the trials of this test were not successful. In fact, many countries could not run the test. After unsuccessful trials, the project was ended. However, in HRSC, it is upgraded and some modifications are realized. Modifications include network support, presentation of the test and scoring procedure. After the modifications, today, five subtests of PORTABAT can work on network environment without any error.

The initial results of this test are very successful. The correlation between AAT and PORTABAT is quite high. It shows the validity of PORTABAT. Although the results are encouraging, this test can not be accepted as completely valid. So this test is being used for only research purposes and the results of PORTABAT is not being used for direct elimination.

### **Interviews**

Interview is the oldest and most relied on tool in personnel selection systems. Although many researches show that there are more reliable tools for assessing the candidates, such as standardized tests, employers still prefer the interviews (Angus B., 1995). Interviews are the core part of TAFA student selection system. Three different types of interviews are applied to each candidate. These are

called psychological interview, group interview and decision making interview.

### **Psychological Interview:**

The first interview in the selection system is psychological interview. It can be classified as an unstructured interview. In this interview, each candidate is examined by an interview council. This council is composed of a wing commander, a faculty staff and a psychologist. They evaluate the candidate's all previous data (test results, psychical fitness test, autobiography etc.), behavior during the interview, willingness to be a pilot and an officer. At the end of the interview, the council gives a score between 1 and 4.

### **Group Interview:**

In this interview, there are five candidates and a council that is similar in psychological interview council. Council chairman gives a discussion topic for the candidates and council members observe the behavior of the candidates. In this interview, the interaction between candidates is evaluated. At the end, council gives a score between 1 and 4.

### **Decision Making Interview:**

Up to now, there has been no serious elimination in the system. The number of eliminated applicants in initial medical check-up and ATT is not so high actually. All the phases are mainly aimed to gather data about the candidates. In this interview, a decision about candidate is given, pass or fail, by the council. The council of this interview is very special. The members are School Commander, Chief of Staff, Dean of Academics and Commander of Cadet. Only the eligible candidates are allowed to take Final Medical Examination.

### **Final Medical Examination**

The candidates who can pass decision-making interview are sent to final medical examination. In this check-up, the candidates who can take "Can be military student and pilot" report from the medical commission can pass this phase.

### **Experimental Flights**

Although interview is known the oldest tool for personnel selection, there is another tool, which may be as old as interview, job-sampling test. In job-sampling test, candidates are required to operate in a standard sample of real job environment. Job sampling test is also being used in aviation. The underlying philosophy is that if a candidate can fly with an easy plane after a few

training hours, most probably, s/he has pilot aptitudes. To think the opposite is also true. If a candidate can not fly an easy plane, most probably, s/he can not fly a jet plane in the future. Another advantage of this in pilot selection is that candidates have a chance to get an idea about being pilot and flying. Alternatively, some NATO countries use simulations instead of real flying because of the standardization difficulties and costs of flights. There are some other countries never use experimental flights.

Experimental flying is the job-sampling environment of TAFE student selection system. In the flying camp, they take courses about flying and safety. After some courses in the class, candidates fly together with their instructor pilots. All training flights take 13 sorties at most. At the end of the 13<sup>th</sup> sortie, only the candidates who can fly solo in their 14<sup>th</sup> sortie can pass examination flight phase.

Although there are many critiques about experimental flights, costs, standardization problems, the role of instructor pilots etc.; TAFE prefer to select pilots by experimental flights. The common idea is that selecting pilot without any flying experiment may cause unwanted results, e.g. high attrition rate in pilot training, high rate of flight accidents.

## Basic Military Training

In modern personnel selection systems, the idea is to select candidate so that the organization and the candidate must satisfy. In order to achieve this aim, organization must introduce itself correctly and honestly.

Up to now, candidates of TAFE are examined for their different personality or ability characteristics. However, they have no chance to live real military life and to decide whether they can live in such a disciplinary environment. In basic military training, candidates have to live in TAFE for one month. In this period, they live hard and very boring military experiences. Candidates who do not obey the rules of the training fail in this phase. However, the main attrition cause is willingness. The candidates who decide not to continue in such an environment give a petition. This self-elimination is very important for the satisfaction of TAFE and the candidate.

## Statistical Data

One of the most important data about selection phases is statistical data. It can give an impression about the application of the stages. It can also give brief information about the importance and effects of each phase. Table 2 shows pass rate in each selection phases of civilian high school oriented candidates.

Table 2. Pass rate of selection phases of civilian high school oriented candidates.

Selection Phase	Sex	
	Female (%)	Male (%)
UEE	2.5	2.5
Initial Medical Check-up	60	76
Tests (only for ATT)	100	88
Decision Making Interview	42	45
Final Medical Check-up	73	45
Experimental Flights	41	57
Basic Military Training	61	74
Total (except UEE)	4.6	5.7

Although the pass rates of the phases change according to sex of the candidates, it can be said that the most important phases are UEE, decision making interview, final medical check-up and experimental flights.

## Future Work

As not all systems are completely perfect, we try to find new methods to select perfect pilots and officers for the 21<sup>st</sup> century. The questions that will be discussed in the future are as follows:

- Should we continue to use UEE scores or should we develop a special examination like AFOQT?
- How can we obtain more predictive tests, especially pilot aptitude tests?
- Can we use aptitude tests instead of expensive experimental flights?
- Should we use structured interviews?

## Conclusion

Candidates who apply for being a TAFE student join really complicated and carefully designed selection activities. During these activities the intelligence, personality factors, and pilot aptitudes

of candidates are examined several times and only the ones who could achieve all these can feel the proud to be students of the Academy.

Since 1911, TAF has insured the future of the country and has been going on with the duty of protecting it at all cost. To be able to realize this crucial duty, TAF has been using the highest technology and it has been selecting the pilots and officers being conscious of the importance that the personnel to use this technology should also be at the highest level.

In this way, TAF will be an important factor for the peace of world with the principal of Atatürk. "Peace at home, peace in the world".

## References

AFOQT Information (1998, February),  
<http://www.afpc.af.mil/testing/docs/afqguide.doc>

AFOQT Information, (February, 1998)  
<http://www.afpc.af.mil/testing/docs/afqguide.doc>

Air Carrier Profile, US Department of Transportation, (March, 1999)  
<http://www.bts.gov/btsprod/nts/apxa/air98.html>

Air Force Missions and Objectives, (September 1999)  
<http://www.hho.edu.tr/cn/mo.htm>

Aircraft Accidents (February, 1998), Homepage,  
<http://162.58.27.106/AAM-600/610/600Air.html>

Angus B., (1995)  
<http://www.psychtest.com/PreEmploy.html>

Bekmezci İ., Orman N.M., (1998), Bilgisayar Destekli Yetenek Testleri ile Uçuş Performansının İlişkisi, Havacılık ve Savunma Teknolojileri Sempozyumu, Hava Harp Okulu, İstanbul.

Bekmezci İ., (1999), Havacılıkta Pilot Seçim Sistemleri, Psikoteknik Ölçüm Uygulamaları, 169-185, Marmara Üniversitesi Matbaası, İstanbul.

Cattell R. B., Eber H. W., Tatsuoka M. M., (1970), Handbook of the 16 PF, IPAT Inc., Champaign, Illinois.

Dolgin, D.L., (1988), Personality Assessment in Aviation Selection, Euro-NATO Aircrew Selection Working Group Meeting Report, Roros, Norway.

Erdoğan İ. (1990), İşletmelerde Kişi Değerlemede Psikoteknik, İstanbul Üniversitesi Matbaası, İstanbul.

İKDM Başkanlığı Görev Analizi (1995), Hava Harp Okulu Matbaası, İstanbul.

İKDM Tarihçesi, 1998 Hava Harp Okulu İnsan Kaynakları Değerlendirme Seçme ve Yerleştirme Merkezi, İstanbul.

Terms of Reference, (1997), 22<sup>nd</sup> Euro-NATO Aircrew Human Factors Working Group Meeting Report, İzmir.

THK Maliyet Analizi Kitapçığı, (1997), Hava Basımevi ve Neşriyat Müdürlüğü Matbaası, 7-59, Ankara.

Turnbull GJ. (1992), A review of military pilot selection, *Aviation Space Environment and Medicine*, 63, 825,830

## Theoretical and Organizational Aspects of Professional and Psychophysiological Selection of Military Servicemen in Armed Forces of Ukraine.

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The development of the Armed Forces of Ukraine and transition to the professional basis of recruitment of military units pose the specific demands to psychophysiological and moral-psychological condition of the officers. The process of reforming the Armed Forces of Ukraine, one element of which is the reduction of the number of servicemen while still maintaining adequate defensive capability of the country should be implemented by using the science-based methodology of studying and practical application of the "human factor" concept, its role and place in estimation of fighting capability of military units. Obviously, the further perfection of battle systems and facilities should be connected to psychophysiological provision of training and battle activity of the troops.

In order to accomplish these goals, a system of professional selection of the officers was established in the Armed Forces of Ukraine. The primary elements of this system are the following (Figure 1) :

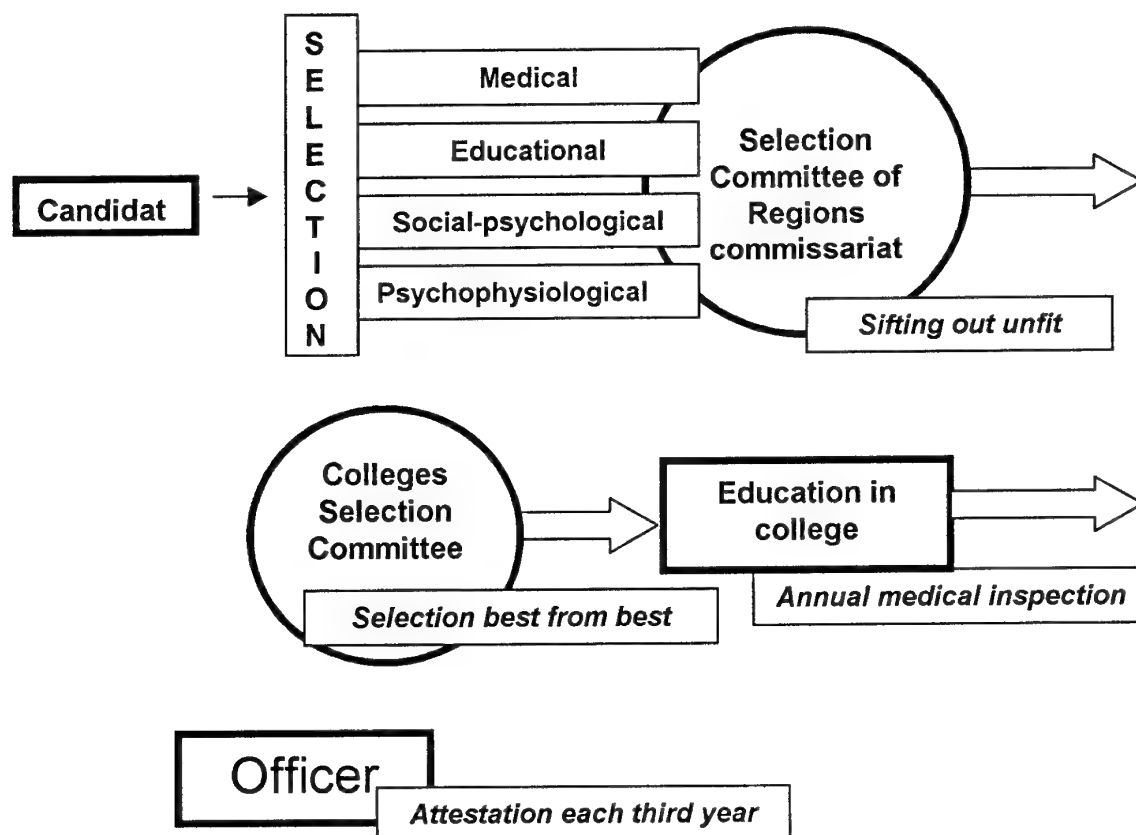


Figure 1. Algorithm of Professional Officer Selection

**The Medical Selection** consists of revealing those persons whose health condition and level of physical development allow successfully and timely, within the strictly regulated terms, to master the specialty, for which the selection was conducted. Further it allows for the selection of the military officers that are reliable and efficient in carrying out their service functions throughout the extended time period without any special health deterioration.

**The Educational Selection** is oriented towards revealing the persons, whose level of knowledge would ensure successful training in the selected specialty.

**The Socio-psychological Selection** is intended for determination of those socially stipulated psychological, moral, and ethical qualities of the prospective officers, which reflect their readiness and aspiration to carry out their service functions in any situations, including the extreme ones and which are necessary for successful work in a group.

**The Psychophysiological Selection** determines the extent of development of set of those individual abilities, psychophysiological properties, and opportunities of the organism of the person, which conform to the requirements posed by the elected military specialty.

The methodological basis of professional psychophysiological selection is based on the theory of individual psychophysiological differences between the individuals and assumes optimal distribution of the candidates to different military specialties in consideration of impartial assessments of their abilities, personal qualities, and properties of the human organism.

The professional selection of officers for the Ministry of Defense of Ukraine represents a system of organized practical conventions oriented towards the improvement of the officers recruitment for military units, reduction of time required for training, instruction, and classes, reduction of the number of those screened and deemed unsuitable for service in the Armed Forces. This professional selection raise the stability of military units, tangible resource saving, conservation of health and professional longevity, the broad personal development and satisfaction with work.

For deciding these problems is executing the regular gathering of information on personal qualities of the candidates and experts demonstrated in various situations in life and service situations, at the different levels of training or professional activity. Normally, psychophysiological inspection is implemented in several stages, the scope and content vary (Figure 2).

The experience gained by the Armed Forces of Ukraine in the field of implementing the professional selection of the officers reveals that the expected social effect of selected activities may be achieved only on the condition of the complex approach to its theoretical development and consequent practical use. The comprehensiveness of our approach provides for availability of the following four basic aspects:

- Scientific and Methodical
- Organizational
- Staff
- Material and Technical

## Preliminary Selection

- Selection of enlisted for a service in Armed Forces
- Selection of candidates for training in military school

- Medical
  - Social-psychological
  - Educational

## Basic Selection

Psychological supervision  
on transits to the unit

## Selection on duty

The scientific and methodical aspect of professional selection provides the justification of general principles of the estimation and forecasting of the professional suitability, professiographic characteristic of activity, justification and development of the activity-posed requirements. Further, it isolates the required body of techniques for determination of the professionally important psychophysiological properties of a person, development of success criteria for training and practical activity, and also development of the guidelines and methodical documents on implementation and perfection of professional selection.

The organizational aspect includes complex interrelated and consistent activities oriented towards implementation of the professional selection. The organizational framework consists of the central managing supervisors and the military executive bodies (slide 6).

The staff provision of professional selection includes preparation of the experts in psychophysiology for the troops, who should be capable to conduct the qualified inspection of the military men and to make reasonable conclusions on their professional adequacy. The selection may be carried out only by the trained experts in psychophysiology, having the appropriate certificate acknowledging their right to conduct the professional selection. Our psychophysiology experts, both practical and social psychologists, are trained at the appropriate faculties of the Ukrainian Military Medical Academy and the Academy of National Defense of Ukraine.

The material and technical provision of professional selection provides for development and creation of hardware psycho-diagnostic facilities, purchase of the required accessories and also the availability of special premises specially equipped for individual and group inspection.

The four basic elements of the system for professional selection of military experts carry out a function of maintaining the practical realization of selection in military bases and educational centers. As a result, the selection system gains the closed-cycle features while keeping all of its elements interconnected.

One of the important professional selection elements is the estimation of its efficiency (slide 7,8,9). This element ensures correctness check of the professional forecasts for the pre-selected persons on the basis of the data from their actual progress during the training or practical activities. Ultimately, the estimation in selection efficiency is socio-economic. It allows to determine practical advantages of introducing the selection system, which in turn is matched to the costs (temporary, material, organizational/staff etc.) to conducting the selection.

In Armed Forces of Ukraine, a number of parameters are applied in order to estimate the efficiency of professional selection, which are divided into two large classes: medical and psychological, and socio-economic. The parameters of the first class reflect the impact of selection on the training progress, efficiency of activity and functional condition of staff, that is defined as "human factor" of fighting capability and fighting readiness of the military units. The estimation of socio-economic parameters of the professional selection efficiency appears to be rather difficult. The work of the military men may hardly be considered in terms of economic categories. Most frequently, the costs saving gained from reduction of the screened and

deemed inadequate students of military educational institutions and training units is under evaluation. In addition, financial benefits from reduction of the training time may be taken into account. The most important result of professional selection, i.e. the improvement of professional skills in the officers, their qualitative characteristics has no financial and economic equivalents so far.

The most difficult task is the estimation of efficiency of selection in higher military educational institutions. A principle of "ultimate result" once again remains the major factor. However, this is supplemented with a series of intermediate stage progress evaluation. The first stage deals with the forecast correctness for the primary psychological adaptation of the cadets at the first grade level. The major selection efficiency parameter here is the reduction of dismissal (as general, so and on professional impracticability). At the subsequent grades, the extents of progress and disciplined behavior are determined. And, finally, at the last grade, the final conclusion on suitability of the prospective officers to their future service is decided upon. Subsequently, this is matched to the data of the service record, which is requested by the educational institution manager for every graduate with one-year experience as an officer.

One of the efficient results of selection application in the professional staff for the Armed Forces of Ukraine is the system of pre-higher education special training (2 to 4 years) of young men in conditions of military lyceums, the pedagogical opportunities and special organization of the student's activity of which promote not only the unbiased selection of the young men for the full-time military service and professional orientation, but also form the professionally important qualities for activity under intense and difficult conditions. Our experience testifies to preferability of such form of training for the prospective officers. So, for instance, only 5-7% of the military lyceum graduates is dismissed from the higher military schools owing to the professional inadequacy. At the same time, the number of cadets dismissed owing to professional inadequacy among those arrived to their military colleges immediately after graduation from the school, ranges from 24% to 42%. The analysis of the commander response testifies to the quality of professional activity of the officers during their first year of service in favor of the former lyceum students who are characterized by high adaptive abilities, strong professional skills and abilities.

However, noticing the high efficiency of professional selection and its expediency for certain officer specialties, we take into account the fact that professional selection in itself is not a unique means to maintenance of high quality and efficiency of the military work, efficiency of battle application of military machinery, prevention of accidents and traumatism in the military men. It may not replace experts' training, their education, instruction, ensuring the rational regimens of work and rest, safe and healthy production environment, creation of the new technical systems and arms with high ergonomic characteristics, group and individual protection of the military experts against impact of the harmful factors, etc.

Nevertheless, our experience in the professional officer selection organization reveals that the careful scientific, methodical, and material provision of selection activities enables achievement of rational distribution of the recruits and military men by specialties and recruitment of military educational institutions with the cadets on the basis of the comprehensive personal estimation, so that to boost the productivity of draft resources and quality of the officers training.



# Significance of Metacognitive Variables on Officer Selection

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## Introduction

The events which have occurred on the international geopolitical scene in the last years have determined the need of a change of the principles which the national defense policy were traditionally inspired to. The end of the so-called "cold war" in particular, making an aggression from the East very improbable and consequently breaking up the bonds imposed by the culture of the opposite blocks, enabled the emerging of multiple crisis on a regional and local level in opposition to the regained global safety. In this scene, the new defense concept, which has progressively asserted itself, has abandoned the traditional static nature in favor of a more dynamic concept, mainly projected out of the national borders and engaged in safe-guarding the stability of international relationships and in the settlement of the ethnical and religious disputes.

All these aspects have made the mentioned operative context of the military field extremely "turbulent" and unforeseeable. According to tradition, the assigned objectives appear paradoxical (obtaining peace through war operations) and extremely changeable. What's more, the above mentioned tasks are carried out by multinational contingents, which makes the organization more complex.

For all these reasons the military organization requires a major flexibility compared to the past, when objectives and "enemies" were understood and stable concepts, even in the long run. This flexibility of the structures, operative doctrines and organization principles must be, first of all, flexibility of the individuals.

Lastly, it is necessary to underline the transformations in the mentioned social context.

The social post-industrial event, with the definit — at least for the western countries — fading of farming and rural civilization and the general rise

of schooling level, determined the start of a pluralism of values unknown to the monolithic society of the past, characterized by the existence of a differentiated and articulated series of needs, behavior and *modus vivendi*, deeply different if not in contrast with each other.

This situation, which has been synthesized by Max Weber with the expression "polytheism of values" sees the definite decline of the "strong" and universal values which in the pre-modern societies were inspired by the concepts of "courage", "honor", "abnegation" and "solidarity", in favor of the emerging of particularism and individualism inspired by the concepts of auto-affirmation, participation and emancipation.

In such a context, the role of the officer — whose specific prerogative coincides with the command of men — seems particularly critical. In fact, nowadays, the sense of discipline and hierarchical subordination constitute only a functional instrument which needs to be negotiated from time to time and cannot be taken for granted.

The protagonists interacting in the Armed Forces today — especially the young — feature new instances and needs inspired to the sharing of the assigned objectives.

## Personnel selection

Every individual that participates in the screening of personnel can be considered, in a certain sense, a cross-section of statistical, physiological, cultural and psychological features variably combined in characterizing both complexity and uniqueness. The taxonomic principles that can be adopted for bringing together such individual characteristics are extremely differentiated and result in being tied to specific cognitive or research needs.

In a simplified manner, it is possible to isolate a further criterion of classification that considers two

distinct orders of requirements and aptitudes. Such orders are not made up of logically equivalent classes but have a relationship between them that we can define as hierarchical. These levels correspond to:

**basic level** — comprising a combination of physiological requirements, cultural characteristics, acquired cognitive abilities, etc;

**metacognitive aspects** — comprising a combination of knowledge, self-perception, evaluation ability, that allow the individual to put into effect a particular behavioral strategy rather than another, using a specific basic capability or a coordinated combination of such capabilities.

An individual who is involved in a definite task will be induced to choose a specific behavioral strategy rather than a different one by a series of evaluations elaborated on the task itself, such as:

- somebody else's expectations to which the individual believes to be bound;
- his/her specific, personal goals;
- and the best way in order to achieve them.

All these evaluations are aspects of the so called metacognitive knowledge of the individual and they represent the above mentioned requirements related to the metacognitive aspects level. Therefore:

*strategy = f(metacognitive knowledge)*

To achieve an optimal performance, in order to accomplish the pre-determined objectives, both levels are necessary, but the most important is the second one — that we can define as the strategic level — which plays a critical role in the cognitive function and determinates the qualitative aspect of the performance itself.

The circumstances of "real life" in which a person normally operates and reacts, in contrast with the conditions used for psychological testing, are not characterized by suggestions — even implicit — with regard to behavior which will be chosen and that, on the basis of the specific individual ability, may or may not lead to the final objective. The critical feature appears, therefore, not to be a specific ability or skill but the strategic talent to use one's own cognitive resources in an efficient manner in function of the specific objective to be attained. An officer in service outside of his normal working environment, for example, no matter how

skilled and precise in shooting (first level), may decide to miss the target and allow the escape of the man with whom, in the future, it will be possible to find an agreement (second level).

In the field of psychodiagnostic we are generally and selectively directed at dealing with the first level of ability discussed earlier. Consequently, it may happen that events belonging to the second level can be completely overlooked or even wrongly interpreted as forms of the first one.

As far as intelligence-measuring is concerned, for example, the instruments commonly used refer to a static and monistic concept; these instruments that:

- cater for the knowledge and ability of the subject in a given moment, consequently evaluating both his present development level and adaptation to his environment;
- on the other hand, they consider intelligence as an isolated factor relating to just that single person, independent from the way in which he/she, in real situations, uses instruments and resources, or is even able to obtain information which could lead him to solving the task.

The complexity of the situations faced by the contemporary man, however, surpass his abilities of independent elaboration and thus calls for an extended and systemic concept of intelligence.

If we define intelligence as the capacity to adapt to different environments that one relates to, or in other words, the ability to acquire information and to use it profitably in different situations, what becomes critical in evaluating intelligence is formulated by the dynamic capability to learn, the ability to interpret and use efficiently instruments, information resources and the available external factors.

## The concept of metacognition

We owe to Flavell the term of metacognition, defined by him as:

*"Knowledge concerning one's own cognitive processes and products or anything related to them ... [such as] active monitoring and consequent regulation and orchestration of these processes..."* and elsewhere *"knowledge and cognition about cognitive phenomenon"*.

Although Flavell is unanimously considered to be the person who directed a systematic way of research and the theoretical reflection on the importance of these variables, it is necessary to observe that the concept of metacognition, even if differently defined, has covered through the years the entire history of modern psychology. The basic idea that underlies the concept of metacognition actually refers to the processes of introspection, self-regulation and self-awareness, that have always been the basis of both research and reflection on psychology.

The difference between metacognitive activity and normal cognitive activity principally lies in its source: metacognitive activity, in fact, is not "activated", it doesn't stem from the "immediate" relationship with external reality but, on the contrary, it is deeply rooted in the internal mental representation of such reality and can include what a person knows and feels about it. For this reason metacognition has sometimes been defined simply as "thinking about thinking", "cognition of cognition". It follows that an indispensable prerequisite for metacognitive activity is the ability to comprehend the exclusively representational nature of one's own and other people thought.

Along with the definitions which refer to the knowledge that the individual possesses about mental functioning, more recent definitions have incorporated into the concept of metacognition the notion of "control of cognitive processes". Such control foresees, in turn, the ability of planning, monitoring, coordinating and testing of the cognitive activity itself, according to the results achieved.

Metacognitive abilities, summing up, appear to be made up of at least two different levels of processes:

- knowledge or metacognitive awareness, that is to say all the knowledge and ideas that an individual possesses about the working of the mind and that can influence such knowledge, (metacognitive knowledge);
- the executive control of the task, or all the processes of control that preside over the cognitive execution of the task itself, (metacognitive control processes).

All this suggests that metacognitive activity is deliberate, planned, intentional, directed to an aim, and is summed up, in synthesis, in an active

control and regulated by cognitive processes to achieve cognitive aims. We could understand the above-mentioned activity, with a concise definition, as the

*"ability of the individuals to carry out heuristic cognitive operations on one's own and other people psychological behavior, as well as the ability to utilize such knowledge in a strategic way, for the solution of tasks"*. (AA,VV., 1997).

From what has emerged it seems we can come to the conclusion that metacognitive variables constitute the most notable elements of cognitive functioning. The same metacognitive variables seem to be responsible for the individual's capacity to contextualize his/her own perception in the environment of the specific social-cultural coordinates of which he/she bears. Such ability appears to be a basic requirement regarding the possibility of affecting an adequate "ethnological decentralization", that allows a flexible adaptation to operative contexts with social and cultural characteristics profoundly different to one's own.

## Aptitude Tests

The psycho-diagnostic tests usually employed in the selection of the personnel result, mainly, as an evaluation of those abilities that we have defined as first level. These instruments, in fact, set the candidate in front of stimulus-situations already defined that, in some way, canalize and predetermine the behavior, and, though being able to highlight specific abilities or competence, don't tell us anything about the strategic level of behavior that has been defined as metacognitive. For such a purpose it would be necessary for the applicant to perceive a specific situation or series of events in terms of a "real problem". That, incidentally, is exactly what happens in daily life, but it is hardly reproduceable within the psychological testing in which, as articulated as they may be, the situations appear as a "banalization of the reality", bearing no relationship to an authentic complexity.

Therefore, "problems" never really exist independently of an observer who defines them that way, but are indissolubly linked to the particular individual or collective way to give meaning to the events. It is in fact an operation of a "mental build up" of the situation in terms of the problem or,

however, in terms of a situation that requires an intervention to re-establish, or to establish *ex novo*, the ideal conditions used as a term of comparison. In addition to the influence exerted on cognitive factors, it is permissible to wait for the metacognitive variables to play a noticeable role as far as personality aspects are concerned.

Their influence, at any rate, is certainly felt when analyzing personality questionnaires. These psycho-diagnostic instruments, used in a selection process, demonstrate the influence of what is commonly referred to as "social desirability"—an aptitude to be included in the metacognitive sphere — which is the more or less deliberate attempt to modify one's responses so as to create a hypothetical image of equilibrium and psychological well-being.

Each candidate takes part to a selection, in addition to the various prerequisites and capabilities of the first level, with expectations, self-perception, typical defensive postures, "ideas" regarding the specific context of the selection and the ideal professional figure which is sought-after. It may happen that the results emerging from the personality questionnaires, instead of emphasizing the hypothetical structure of the candidate's personality or shed light on eventual states of emotive discomfort, might be indicative of a candidate's personal style of presentation.

In administering such tests we have occasionally come up against — especially with lower cultural level or culturally disadvantaged candidates — a consistent increase of pathological indicators. Further investigations on such candidates often exclude the presence of symptoms of clinical relevance, showing, on the contrary, the presence of other interpretative hypotheses, generically definable as "meta" ability, focused to the accomplishment of specific goals.

## Conclusions

The increasing employment of multinational military contingents in overseas operational contexts imposes the identification of more elaborate and sophisticated psychological profiles. In former times, officers went through selection procedures aiming at sociological and operative realities which today can be considered obsolete.

According to this point of view, we have underlined the importance of the metacognitive variables in the functional self-regulation of behavior, especially in contexts where automatism and behavioral strategies fail.

Our work is to be looked upon as a stepping stone, a stimulus for a discussion that could lead to a re-definition of new operative procedures and diagnostic instruments able to meet today's needs.

## References

- AA.VV., "La funzione metacognitiva in psicoterapia: Scala di Valutazione della Metacognizione (S.Va.M.)", *Psicoterapia*, 9, pp. 91-107, 1997.
- BATTISTELLI Fabrizio, *Soldati. Sociologia dei militari italiani nell'era del peace-keeping*, Franco Angeli, Milano, 1996
- CORNOLDI Cesare, *Metacognizione e apprendimento*, Il Mulino, Bologna, 1995.
- HACKER Douglas J., "Metacognition: Definitions and Empirical Foundations", *Paper of the University of Memphis*.
- OSBORNE Jason, "Measuring Metacognition in the Classroom: A Review of Currently-Available Measures", *Paper of University of Oklahoma*, 1999.

# Officer Qualities

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## Summary

The qualities of an officer have been analyzed and defined countless times, over many centuries. Probably, there is no single accurate description which can encompass completely these myriad views and opinions. This presentation will be a *personal* view on officer qualities by a UK officer with 2 five-year experiences in selecting officer cadets and then training them during their initial officer training.

Discussion will revolve around the *qualities* of an officer and will try to differentiate the true, effective leader from those who sometimes wear the trappings of rank without, perhaps, having many real leadership qualities.

There is often confusion between Management and Leadership and so the differences between the 2 styles will be briefly analyzed. Listed also for consideration will be the leadership qualities which are regarded as important by 4 separate NATO military academies. Clearly, these lists are for the ideal, generic officer and it is interesting to note the difference in emphasis between the various lists of the different training establishments.

The paper will finally move on to Officer Selection and highlight some of the qualities, raw or potential, which can be identified and assessed during an officer selection process.

## What is Leadership?

Most officers lead a complex, technical life, with many highly-specialized duties to perform. These duties are his responsibilities as an individual, and as a highly-trained, responsible member of an exacting profession. In addition, an officer has to lead his men. An officer does not exist for his individual, personal value, but for his ability to show the way and make his men want to follow. This is indeed the *core* of the officer's existence and, without it, no hope exists of grappling with the tasks of command. It is seen at its simplest in warlike operations, but the power to lead smoothes the way of every task in every branch of a military organization, whether in war or peace. It breathes that vitality into an organization that will take a collection of men, buildings and machines, and waken them to purposeful, effective life. How is this done? First, and perhaps ideally, by innate force of character. Clearly, people are not all born with the same characteristics, and some from their earliest years have felt the power to show others the way, and to influence their minds. We call them *born leaders*, and they are just that; born with strong, independent, assertive minds just as some individuals are born with a good, natural physique. But this is not to say that the characteristics of effective leadership cannot be taught and acquired, just as a good physique can be cultivated with suitable effort.

In all of the words spoken and written about leadership, one fundamental point continually emerges; namely that, for most, the skills and qualities of leadership are not normally acquired instantly. The training of a leader, whether it be formal or through experiences, takes many years. Appropriate experiences are necessary, both to build and develop the leader's own force of character, and also to increase his ability to influence others.

So, what is Leadership? In the simplest of terms, Leadership can be defined as "getting things done" or, perhaps, the combination of *example*, *persuasion* and *compulsion* that makes the military subordinate do what is wanted of him. Clearly, in a military environment, things have to be done, but leadership is not just getting things done, but getting them done in the way in which the leader wants them done, in all conditions, and with the consent of the team, however grudging that consent may be.

Some, if not many, military leaders do not *lead* effectively. They hold a title and they are figureheads at the head of the pack. However, their leadership is a facade and there is little of substance behind the mask of authority defined by the badge of rank. Clothes of authority, however, cannot in themselves generate either ability or effectiveness as a leader. Clearly also, the abilities and effectiveness of any leader are only as strong as are perceived by those who are led.

Most military organizations have a highly-structured bureaucracy. Unfortunately, in peacetime, these bureaucracies are often able to develop and promote the 'Empty Suits', an appropriate euphemism which describes individuals who dress and present well, who are able to identify the right, vital progressive routes for themselves, but who have very limited raw and genuine skills of leadership, save for one essential facet, that of not putting their feet wrong. Such individuals are, in essence, light-weight 'polystyrenes', they merely fill a place. However, they remain clean-coated and trouble free, and thus they progress, whilst those with more genuine substance depart, often out of frustration. Unfortunately, polystyrene cannot "rock a boat", it cannot step out of line, it cannot stimulate change, it does not take risks and, certainly, it cannot inspire. In times of peace, the 'polystyrene' empty suits remain the guardians of the *status quo*, the keepers of the book of rules and the stiflers of energy and initiative. Their reliability is without question, but so is their predictability. Simply, their leadership is mundane.

A *real* leader must be an agent for change, an inspirer and developer who is able to show the way forward, integrate people and ideas and be prepared to instigate rapidly the most effective option. Particularly, in times of tension or war, an effective leader will have to be able to bring both colleagues and subordinates along in a way that is *at once* identified as pragmatic, meaningful and militarily cost-effective.

Military and naval history is full of effective leaders such as Washington, Wellington, Nelson, Bonaparte, Montgomery and Rommel who rose to the top, not by preferment or substantial support from acolytes, but simply because of their abilities, both strategic and personal, which enabled them to inspire their men and, most importantly, achieve military success.

In past conflicts, battles and wars were usually lengthy. Incompetent or irrelevant leaders could be, and usually were, identified, replaced and sometimes they were even shot! Inspirational leaders could develop their forte and earn recognition by success. However, most recent, international wars have lasted for just a few weeks, and future wars can be expected to follow this trend. NATO planners are well aware that they will have to fight with the men and materiel that they have to hand and in stock. Perhaps even more significantly though, battles will have to be directed and fought by the leaders already appointed and in place. The 'polystyrene', empty-suit commander would be found wanting and no doubt would be identified in the aftermath during the soul-searching of 'Lessons Learned' – but at what cost?

It almost goes without saying that, in war, a leader should not have to compromise. In war, it is unlikely that a *real* leader would accept compromise. Yet the 'Empty Suit', whose life and career had developed out of frequent compromise and assent, would probably find the transition to the warrior's outlook in times of conflict an impossible hurdle.

#### Leaders and Managers

The differentiation between a good leader and an effective manager is, to many, nebulous. Simply however, managers are usually measured by their performance within set, pre-determined parameters. Leaders should be judged by higher requirements, often not pre-set and, especially in times of conflict, usually surprising. That said, it is difficult to imagine that an effective manager would not have some skills of leadership within his persona. Similarly, it would be surprising to find an effective leader who was bereft of management skills. However, the fundamental, singular difference between Management and Leadership is that Leadership particularly is about effective change-making and the single-minded application and enforcement of that change, however unpalatable the change may be.

Military leaders, overall, must have a breadth of long-term vision, be decisive and independent, act and stand firm, be a *warrior*, speak openly, plainly and frankly, learn quickly from defeats and mistakes, go forward with unswerving fortitude, and know and appreciate the requirements and interests of subordinates. The qualities and skills of a leader are unlikely to be totally intrinsic and they would have to be developed over many years and with much, appropriate experience. Yet, to a great extent, there would have to be an innate and solid foundation, coupled also with flair and charisma. Sometimes the qualities of leadership would be natural, but mostly they would metamorphose by effective, early nurturing and constant, later development.

Conversely, management skills can be taught more easily and they can also be learned. That said, management is not necessarily a routine process. Management problems vary considerably and a pre-set formula for effective management would rarely work. However, management can be effective without flair or charisma; genuine leadership, particularly at higher levels, cannot. *De facto*, leadership has to be flexible and imaginative with positive and often urgent, effective reaction to the unexpected.

In summary, Leadership requires extraordinary attributes above and beyond those of management and the simple, efficient organization of the *status quo*. However, that is not to suggest or infer that management is easy and leadership is necessarily difficult. The required capabilities, however, are different and can be summed up by the following list:

#### The Leader

Inspires  
Thinks  
Motivates  
Initiates change  
Challenges  
Creates  
Proacts  
Shapes actions  
Dictates  
Takes decisions  
Sets objectives  
Sets the pace  
Driving force  
Unmethodical  
Front of camera  
Inspires loyalty  
Apart from others  
Self sufficient

#### The Manager

Controls  
Does  
Organizes  
Adjusts to change  
Accepts current practice  
Administers  
Reacts  
Responds to circumstances  
Follows through  
Implements decisions  
Gets results  
Concentrates on procedure  
Coordinator  
Methodical  
Back stage  
Motivated by discipline  
Involved with others  
Depends on organization

#### The Assessment of Leadership Qualities for Selection

Over the years, every military organization concerned with leadership training and development has developed its own list of 'Leadership Qualities'. The following lists are just 4 examples from many: These lists were obtained some 5-6 years ago. It is possible that the lists have changed since and so, the sources have not been attributed. They are useful, however, in highlighting the differences of emphasis between differing armed forces and nations.

##### A

1. Bearing
2. Courage  
(Physical and Moral)
3. Decisiveness
4. Endurance
5. Initiative
6. Integrity
7. Judgement
8. Justice
9. Loyalty
10. Tact
11. Unselfishness

##### B

1. Confidence
2. Determination
3. Initiative
4. Awareness
5. Effective Intelligence
6. Decisiveness
7. Manner
8. Self-analysis

##### C

1. Loyalty
2. Professional  
Competence
3. Courage
4. Honesty
5. Common Sense
6. Good Judgement
7. Confidence
8. Initiative
9. Tact

##### D

1. Integrity
2. Knowledge
3. Courage
4. Decisiveness
5. Dependability
6. Initiative
7. Tact
8. Justice
9. Enthusiasm



- |                      |                   |
|----------------------|-------------------|
| 10. Self Control     | 10. Bearing       |
| 11. Humour           | 11. Endurance     |
| 12. Personal Example | 12. Unselfishness |
| 13. Energy           | 13. Loyalty       |
| 14. Enthusiasm       | 14. Judgement     |
| 15. Perseverance     |                   |
| 16. Decisiveness     |                   |
| 17. Justice          |                   |

None of the lists are complete, yet none of the lists are inadequate. Opinions obviously vary as to qualities needed by a military leader and the particular emphasis placed on them. Clearly, the 'great' leader would have most of the qualities in substantial strength, perhaps out of an amalgam from these lists. However, most leaders will be short of some of them. It can be seen that some qualities are common to nearly all lists, and they are the fundamental requirements for the military leader, to a certain extent regardless of rank. Significantly, you will note that none of the lists include *flair*, although *initiative*, perhaps in this case meaning the same, is in all of them. Similarly, none of the lists include *charisma*, which is sometimes difficult to define, but an easily identifiable quality seen in so many great leaders. *Confidence*, a vital quality in a leader, is omitted from some of the lists. Not that this is necessarily surprising or significant however, because it would be easy to argue that any leader with a substantial number of the qualities within any of the lists would, inherently, possess appropriate self-confidence. Confidence, however, *has* to be a vital quality and one promoted more by the leader than by anybody else. If the leader is certain of his own ability to lead, and this facet can certainly be developed and strengthened by training, and confirmed by experience, then the leader will also be able to generate confidence within the team, which also is so vital to success.

In recognizing and accepting that no list of leadership qualities is likely to be complete, lists could probably be reduced without losing too much in the way of positive effect. Field Marshal Lord Harding, a British commander in World War 2, listed the qualities he regarded as essential in a leader in the simple, following terms:

Absolute Fitness  
Complete Integrity  
Enduring Courage  
Daring Initiative  
Undaunted Willpower  
Knowledge  
Judgement  
Team Spirit

#### Are all Officers Leaders?

It would be an understandable misconception if all military officers were expected and required to be genuine *leaders*. Whilst true leadership, for some officers, is a paramount pre-requisite, in other officers, raw leadership skills are much less important. As the roles of the officer vary enormously, so does the preferred list of qualities required by the individual.

However, the closer the officer is to the battle, with the consequent, greater risk to life, then the more *dynamic* and *decisive* the leader will need to be. Even in times of war, the rear echelons and the support staff, because of their comparatively, risk-free existence, will not usually need quite the abundance of raw qualities required by the warrior under fire. It follows therefore that, when identifying officer potential during the selection process, due regard should be given to the individual's planned future employment as an officer. For instance, the quality requirements for the potential platoon commander, fighter pilot or submariner will certainly be different to those pre-requisite qualities for the engineer or logistician.

#### Officer Selection

Whilst the differing roles of an officer will usually require a different emphasis on particular qualities most, if not all, NATO officer selection systems can aim to identify *generic* potential only. Later, professional training will then identify and develop the specific qualities to type. The word *potential* is significant. A selection system, by its very nature, has to have a programme which, at best, runs for just a few days. Whilst some true



qualities in a candidate may possibly emerge and be identified during the selection process, an effective assessment system has to be geared to look more for *potential* in a candidate than inherent attributes.

No selection process can ensure a substantial, guaranteed end-product. The period of examination will invariably be short and it will sometimes provide only a snapshot of the candidate's potential. However, past history, and the candidate's record of development, will also be a very useful initial guide. Aptitude testing can give notice of the candidate's suitability for an aptitude-dependant branch and then further assessment, by interview and additional exercises, will help to ascertain the candidate's overall profile. At interview, close examination of the candidate should reveal the following qualities and traits:

1. Apperance and Bearing. The candidate's appearance, bearing, grooming, distinguishing features and general presentation should be readily apparent within the first impressions formed at interview.
2. Manner and Impact. The candidate's conduct throughout the interview, along with his courtesy, tact, confidence, force of personality, presence, poise, polish, humour and alertness will add to the overall impact.
3. Speech and Powers of Expression. Dialogue with the candidate will elicit his ability to communicate. The quality of grammar, vocabulary, diction, general fluency, logic, projection and animation will all indicate the overall effectiveness of spoken expression.
4. Activities and Interests. The well-rounded candidate should have had a varied, interesting and fulfilling lifestyle. Whilst it is important to bear in mind the individual's background (that is, general opportunities and financial limitations) the range and extent of spare-time activities are important to indicate signs of commitment, depth of involvement, achievement, level of responsibility, spirit of adventure, determination, initiative, enterprise and self-reliance within an overall balance of interests and pursuits.
5. Academic Level and Potential. Whilst minimum levels of academic qualifications will be set, the manner and ease of obtaining qualifications, together with the level of commitment, diligence and attitude towards study will all give indications of the individual's further academic potential.
6. Breadth and Depth of Outlook. The candidate's general awareness of military matters and current affairs should confirm a maturity of outlook and a general ability to reason, giving also some indications of general intellect.
7. Motivation. The candidate's determination towards his military goals should be ascertained. Sometimes the motivation will have previous substantiation. It will be important to ascertain that the candidate is clear about, and would relish, the commitment and dedication demanded of the officer corps.

Beyond the interview, individual tasks, or group exercises with other candidates, will give further opportunities to observe additional qualities and indications of potential:

1. Manner. Again, the candidate's manner can be assessed within group exercises. Enthusiasm, confidence within the group, openness and a lack of pretence, humour, tact, tolerance and reaction to pressure may be observed during further assessment beyond the interview.
2. Teamwork. The extent to which the candidate acts for the common good, the willingness to tackle tasks and the contributions towards the team and the set goals can be observed within the group.
3. Physical Characteristics. General fitness is an important officer quality and there should be opportunities to place the candidate in physically-demanding situations in order to note the physical determination, robustness, energy and stamina of the individual.
4. Leadership Potential. Tasks to elicit leadership *potential* should test the individual's drive, decisiveness, influence, receptiveness and assertiveness within the team. General presence, a sense of purpose and persistence, coupled with the ability to gain the support and respect of other candidates, should be apparent under further testing.
5. Effective Intelligence. General perception, that is an ability to assimilate relevant information and form a logical plan with sensible judgement, and the wherewithal to recognize what is important when faced with a

mass of detail can be identified under further scrutiny. The ability to think ahead, and plan for problems before they arise, reacting quickly and accurately when faced with unexpected events should indicate an effective brain. The basic ability to reason, with a capacity to understand, *and* the mental ability to process the information and ideas, can further indicate useful intellect.

Clearly though, not all of the skills, qualities and potential mentioned are likely to be manifested during any assessment period. What has been mentioned is the ideal. However, any assessment process must be sufficiently in-depth to ensure that the candidate has the opportunity to demonstrate a good cross-section of such qualities or, indeed, highlight unrectifiable or untrainable weaknesses which would be an unacceptable risk during officer training and development.

### Conclusion

The qualities required of the officer are numerous. It takes an amalgam of qualities to make an effective officer and the overall mix of the qualities is very much dependant on the role which the officer is expected to play. Sometimes, these qualities will be inherent but, more often, they will form and develop over years and experience and training. Selection of officer candidates must look more for *potential* and trainability rather than raw, developed qualities. Finally, the good officer in our world's society is a rare breed ..... and that is rightly and *essentially* so.

# EVOLUTION OF APTITUDE TESTING IN THE RAF

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## Summary

This paper outlines the history of the RAF aptitude test system and the changes made to aptitude test development programmes and testing policies which have been driven by technological and psychological advances and the requirements to assess for different specialisations and be cost effective. Consideration is also given to the next generation of aptitude tests.

## Introduction

The history of testing in the RAF can be traced as far back as the beginning of WWII. Before 1940, the RAF was almost entirely dependent on the unstructured interview as its main aircrew selection method. The interviews were entrusted to serving officers who had no other brief than to find the right 'types'. They were expected, without guidance on the relative merits of personality, attainment and skills, and without the technical aides to measure them, to decide who should be accepted or rejected for aircrew selection. It was said later, that if a candidate had been to the 'right school', was tall, smart and in possession of rugby boots and a bible, he was officer material. If he rode horses as well, he was pilot material!

## Test Development During WWII

The limitation of the 'it takes one to know one' approach became glaringly apparent when the high incidence of pilot training failure rate - in the order of 50% - became a major issue at the start of WWII. A systematic testing procedure was consequently introduced as a permanent feature of the RAF selection system.

The first set of standard Aircrew Selection Board testing procedures included essay writing, a 15 minute Elementary Maths Test (EMT) and a 15 minute General Intelligence Test (GIT). There were three parallel forms of GIT, each with twenty verbal items. These became the first aircrew selection test battery and attempts were made to standardise the test results for ease of cross test comparison by expressing them as five letter grades based on a 1-2-4-2-1 population distribution but no cut-off scores were calculated.

These early tests were developed by Prof. F.C. Bartlett of Cambridge University at the request of the Air Ministry, which recognised the importance of objective selection testing in reducing training wastage rates. In 1941, it founded its own research unit, the Training Research Branch, to provide professional support in developing aptitude tests, other selection methods and training programmes. From this point on, all work on selection and training was centralised.

Four major developments then followed.

1. First, the RAF formally recognised the need for separate assessment of skills and personality characteristics as a result of the introduction of Flying Grading in 1942. 'Grading' entailed a short period of 12 hours flying at Elementary Flying Training in which the students' performance was recorded, assessed and analysed. D'Arcy (86) recollected that the Training Research Branch conducted a study showing grading to be a good predictor of subsequent flying standards and accident rates among student pilots. There was a clear correlation between ability at grading and speed of learning in subsequent training.

2. Attention then shifted from the general assessment of all aircrew to specific roles. In 1942, two years after its first introduction, the standard test battery was augmented by an electro-mechanical coordination test (SMA3) for pilot selection and a three part test that involved directions, tapping and morse for wireless operator selection. The addition of the coordination test increased the credibility of the aircrew test battery for pilot selection and it was the first time the battery was convincing enough to endure the periodic close scrutinies made of selection procedures. A second electro-mechanical coordination test (CVT), also devised by Cambridge University (Prof. K J Craik), was later added and brought into executive use in 1944. The wireless operator test was well accepted when its introduction led to a fall in wastage from the basic signal course.

3. During the same time period, the Training Research Branch, under the direction of Dr Parry and with the assistance of USAAF, developed a series of objective methods which were later introduced for aircrew selection in 1944. Most notable among them was a suite of 24 aptitude tests for the selection of all six aircrew categories. They were designed to reveal skill levels relevant to one or more elements of the job of flying. The combined effect of the measures resulted in higher standards of pilot cadets being sent to grading and, in due course, a startling reduction of pilot training wastage from 48% to 25%.

4. Lastly, although all tests were initially administered by orderlies, it soon became evident that specially trained staff were needed to cope with test administration, answering candidates' questions and marking a large number of test papers. A new

trade 'Clerk Personnel Selection', was formed and its members were subject to selection and a two-week course. This was another foundation stone in that it provided the basis for standardisation of test conditions and test score interpretation.

The RAF, starting from nothing in 1940, had developed a comprehensive and effective aptitude testing procedure by 1944. In general, tests developed in these four years were either knowledge based tests, that might be influenced by prior experience, or work sample tests resembling various aspects of flying tasks.

#### **1944-1984 Consolidation**

Between 1944 and 1984, many more experimental tests were devised and evaluated by psychologists of the Research Training Branch, which was by now known as Science 3. Some of the new tests were introduced to replace or supplement earlier ones. For instance, a three-test Fighter Controller Test Battery was introduced in 1953 and from it an Air Traffic Controller Test Battery was developed. However, by and large, no critical changes were made to the original system established during the war. The only main advance was that, by 1984, the number of aptitude tests used for selection was streamlined to 15 but they still shared a striking resemblance with those of 1944.

It was indeed a credit to the psychologists of the 1940s that they had devised tests that retained good predictive qualities for such a long period of time. However, it became difficult for their successors to devise tests with improved predictive ability because limited trialing opportunities and relatively rudimentary technology limited the scope for development. Early tests were either paper/pencil based or relied on obsolescent electro-mechanical apparatus. The test administration procedure and record keeping was labour intensive. There was therefore increasing frustration amongst the psychologists who had to collate both the manual records of test results and training data to evaluate the psychometric properties of tests and their predictive effectiveness. The process was time consuming and errors were easily made. By the late 1970s the concept of, and the need for, aptitude testing were well established, although there was a lack of financial resources.

For the first 20 years after aptitude testing was introduced, flying grading continued to be used in parallel, acting as a second selection filter. However, with the closure of the Preliminary Flying School in 1974 pilot selection relied entirely on aptitude test results. Due to changes in the flying training programmes and system, introduction of new aircraft and poorer quality candidates being attracted to the RAF in the 1970s, the pilot test battery's validities dropped considerably from the reported 0.34 in the early 60s to 0.18 with grading and 0.14 with training results. Inevitably by the late 1970s the utility of the tests, for

both aircrew and controller, was widely questioned. The House of Commons Defence Committee recommended funds for further research and development and the proposal was endorsed by the Ministry Of Defence (MOD). This became the main impetus for the second generation of RAF selection tests.

#### **Second Generation of Selection Tests**

The advent of cheap micro-computer technology opened a whole new world for test development. This MOD computer-based test development project was conducted in two stages. The first provided computerised versions of existing tests currently used for selection. Migration to computerised testing was successful and computerised versions were in use at the Officers and Aircrew Selection Centre (OASC) by September 1985. The success of computerising existing selection tests was measured in terms of their distributional characteristics and reliabilities. Although differences in the means and variance were observed in some test scores, the computerised tests' reliabilities were as good as, if not better than, the original versions. The most noticeable improvement was in test-retest reliability, especially with the two co-ordination tests that were then used.

In the second stage, new tests specifically designed to be computer-based were developed and validated. Initially a task analysis based on the Fleishman Ability Requirements Procedure was carried out to identify the ability requirements of the RAF navigator role (Burke, 83). Ability domains relevant to Fleishman's taxonomy were then used as the basis for the development of new computer-based tests. A domain basically is a broad collection of similar aptitudes. The navigator study was immediately followed by a review of controller tasks and the development of computer-based tests for a new Air Traffic and Fighter Controller Test Battery (ATFCTB). Key features of it were the dynamic nature of some tests and that some tests involved multiple tasks which yielded several measures. A number of exploration analyses were carried out and scores on such multiple measure tests were analysed to develop algorithm based composite scores combining speed and accuracy or consistency in performance over several within test measures.

During the ATFCTB development, Hunter and Schmit (86) examined a total of twenty three tests and ninety associated test scores. Consideration was given to the psychometric properties of each test and associated scores, the inter-correlations between the different scores and each test score's predictive ability of pass/fail outcome at the end of the basic training course. Nineteen test scores were brought forward to the eventual regression analysis of which nine were identified as giving optimal prediction for both ATC and FC selection. The nine test scores were weighted to show their relative predictive powers, according to the beta values from the regression analysis. The summary score was simply the combination of the nine weighted

**Table 1** *Current Set of Ability Domain Adopted by OASC*

<b>Verbal Reasoning</b>	This refers to the ability to interpret and reason with verbal information. It is the ability to identify patterns in presented information and to solve problems by combining sensible rules of thumb with a logical approach.
<b>Numerical Reasoning</b>	This refers to the same type of ability as Verbal Reasoning, but relates to information presented in numerical format.
<b>Spatial Ability</b>	This refers to the ability to form mental pictures and manipulate spatial information in the mind.
<b>Attentional Capability</b>	This refers to the efficiency with which an individual can deal with visual and auditory information in real time. It is related to 'capacity', a term often used by RAF operators, and 'attentional flexibility'.
<b>Work Rate</b>	This refers to the ability to deal with simple tasks quickly and accurately.
<b>Psychomotor</b>	This refers to eye-hand and eye-hand-foot coordination.

test scores. The ATFCTB predictive ability was found to be very good at 0.52.

#### **Review of Testing Policies and R&D Programmes**

Up to this stage, all of the RAF test battery structures could be perceived as being based on a "validity driven approach" to test battery development. No formal job analyses were carried out to identify actual job requirements and so define the structure of the batteries for each specific role. Test designs tended to be driven by psychological theories and the availability of adequate test delivery systems. It appears that tests thought to have the potential to predict training success were developed on an ad hoc basis and those validated were then included or excluded from the battery depending on their proven validity. Tests might be weighted depending on the beta weights resulting from regression analysis. Two potential problems can arise from this empirical approach to individual tests and test battery development.

First of all, the validity of a particular test and the weight allocated to it in a particular battery might vary as a result of different studies because validity data tends to be sample dependent. Statistics, such as validity coefficients and beta weights, are generated to explain the maximum variance in the data set and are, of course, driven by the same data set. However, validation studies are not always based on high quality data sets within which parameters remain unchanged and so, validity coefficients and regression generated test weights may not be replicated in subsequent validation studies. For example, there might be variations in trainee quality and/or training programmes. To take the ATFCTB as an example, although its validity remained good, it was found to have reduced to 0.44 in the latest validation study (Bailey, 96) and three of its test scores showed zero predictive ability while beta weights derived from

regression analysis suggested that some test scores should be weighted differently.

Secondly, any battery structure might be biased by the range and quality of tests subjected to analyses. Attentional capability, for example, may have been a relevant attribute but no test of it might have been available for a validation study. Spatial ability might also have been relevant, but the test chosen to measure it might have had poor psychometric properties and consequently be rejected because only good tests contributed to the structure. In other words, aptitudes that should be measured by the battery might be inadvertently omitted, while other tests included in the battery might be measuring similar aptitudes and be reducing the "cost benefit" of the battery through duplication of effort.

In the 1990s, the RAF started to shift emphasis away from tests themselves to the aptitudes that they measure. A 'Domain Centred Framework' was adopted to conceptualise aptitude testing policies and to direct test battery development. This approach was originally introduced by Burke in the early 1990s and was later developed by Bradshaw, Hobson and Bailey. The change in testing emphasis has been discussed in detail in a paper by Bailey and Woodhead (96). In practice, any number of domains may be defined and a working set will probably evolve over time dependent on the organisational requirements. The current working set of domains adopted by the OASC is consistent with Carroll's work (93) and is outlined in table 1.

Four domain-driven task analyses followed, of which two were rational weight studies to identify aptitudes required for the pilot and navigator roles in order to define the structures of these two test batteries (Bradshaw, 93; Hobson, 95a). A rational weight study can be considered as a coarse job analysis in which

subject matter experts, individuals with a thorough knowledge of the job, are asked to evaluate the importance of each domain and the suitability of available tests. The other two were detailed functional job analyses on Air Traffic and Fighter Controllers (Bailey, 95; Bailey, 97). Each role was progressively broken down to individual job tasks at operational level. The importance of each job task was then weighted and the aptitudes required for each job task identified. As expected, the results of all four analyses showed that none of the existing batteries covered all the domains relevant to role. It was also clear that weights of individual tests did not reflect specific training requirements. The tasks analyses results, on the other hand, provided empirical data from which an ideal battery structure could be derived.

Another major step was taken in developing the "Domain Centred Framework". A new procedure has been adopted to calculate test battery composite scores. Instead of weighting individual tests, their results were converted into z scores and then the scores of tests in each domain were averaged to give a domain score. Domain scores were then weighted according to the task analysis results before being combined to give the composite score. In this way, the emphasis of the composite score is placed on domains rather than individual tests.

In order to impose a domain structure on a test battery it is first necessary to identify which tests are appropriate measures of which domain and which tests within each domain are rationally related to the specific role requirements. It was recognised that empirical analysis was particularly important because perceived wisdom regarding what a test actually measures is not always the same. Bradshaw (97a) carried out an audit on the whole RAF suite of tests and provided information about their qualities. Factor analyses were also used to identify the construct of the tests in relation to the different domains. As a result, psychometrically poor tests were removed from the suite and domain areas that were not adequately covered by the current range of tests were identified. Before these developments, there was no clear picture of what tests reliably measure within each aptitude domain. Now, we have a much better idea of what the shape and direction of our R&D effort should be.

The "Domain Centred Framework" has shown the following advantages.

1. It clearly indicates the types of ability required for training in different roles and those which should be measured at the point of selection to indicate candidate potential. The testing programmes tend to become driven by actual job demands and it is less likely that relevant aptitudes will be overlooked and/or inappropriate weightings assigned.

2. It is anticipated that a domain based composite score will be more robust and reliable because it is based on a number of domain scores, each of which is derived from tests covering a range of similar aptitudes.

3. Moreover, because abilities required to succeed in training were used as prediction criteria, batteries are less likely to be affected by changes in training syllabus and should remain in executive use for longer.

4. Lastly, because this model places the focus on ability domains, some of which might be common to more than one role, the same tests can be used for selecting different specialisations. Overall test time for RAF candidates can therefore be reduced. (In the RAF, we test candidates for several roles simultaneously and are able to offer alternative specialisations to candidates who have not scored sufficiently well or for whom training places might not be available in their first choice.)

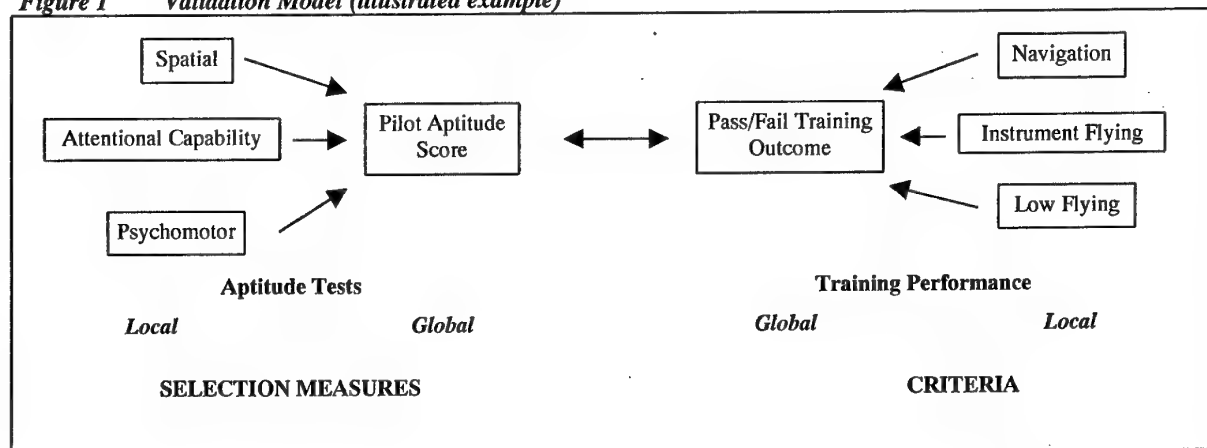
The domain approach might not be the optimal answer to test battery development or to directing R&D effort, however, we have found it useful because it enforces structure onto test batteries. Otherwise, as Bradshaw (95) concluded '.... the structure would become a *hostage to fortune* and dependent upon the design and outcome of successive validation studies'.

#### Formation of a Validation Model

In common with other organisations, RAF selection tests aim to identify individuals with the best chance of success in training. However, in order to provide an accurate indication of the effectiveness of a particular test, the choice of criterion against which it is evaluated is important. There must be a strong theoretical relationship between the selection test and the criterion used.

Traditionally, validation studies in the RAF used pass/fail training outcome as the sole criterion to evaluate the effectiveness of their tests. Pass/fail is a global criterion encompassing a number of minor local assessments of student performance. It is consistent across different training courses, making it easier to assess a test's predictive ability in general and to compare the predictive abilities of tests. However, in the 90s, training performance ratings were used more and more frequently as validation study criteria. The reasons are outlined below.

1. The non-specific nature of pass/fail is likely to attenuate the full validity of a test because it does not provide information about how well or poorly any student performed in different parts of the course, or about how good or bad was any student's overall performance. On the other hand, performance rating on a continuous scale provides quality data on overall

**Figure 1** Validation Model (illustrated example)

student performance as well as progress in different elements of training. A detailed functional task analysis would identify the aptitudes required in different training areas that can be mapped onto the structure of the battery.

2. A dichotomous criterion such as pass/fail, places an upper limit on the maximum theoretical correlation coefficient that can be obtained to reflect its predictive validity. The effect is most noticeable when the dichotomy (e.g. pass rate) deviates significantly from 50%. In the 90s, this became a major concern because the pass rates of most RAF training courses were 70% or above; notably, the pilot training pass rate was in the order of 90%. If such pass rates were to remain constant or increase, the usefulness of the pass/fail criterion would decrease in proportion, despite the availability of statistical correction procedures.

The "Domain Centred Framework" approach to test battery construction and the criteria discussed so far led to the formulation of a simple validation model which is now applied to all validation studies of RAF selection methods. The concept was first introduced by Bailey (94) to validate officer qualities assessment ratings and the model was further developed by Hobson (95b, 95c) for validating the pilot aptitude test battery. It is perhaps best illustrated using the following example. If a pilot job analysis results indicated that a spatial ability test would be a useful selection tool for the instrument flying part of pilot training and a spatial test were consequently incorporated into the test battery, subsequent validity data might show that, while the new spatial test indeed related in part to pass/fail, it related best to the specific part of flying training concerned with instrument flying. Thus validation against this criterion would have provided the best estimate of that test's performance and its predictive validity would not have been overshadowed by other tests within the battery. In summary, this validation model makes a distinction between global and

local selection measures and global and local criterion measures (Fig 1).

In practice, there is a danger that all predictive criteria might inter-correlate. This can be avoided to some extent by using factor analyses to categorise the different criteria in terms of ability domains with a composite score for each. The potential benefits of this validation model outweigh its potential problems. For instance, it provides a more accurate assessment of a test's validity because it refers to the specific relationship between tests and training performance. Moreover, individual tests might be predictive of certain parts of the training programme but show poor validity when considered against the global criterion. Such tests might therefore be discarded mistakenly because their true validity is hidden.

#### Testing in 2000s

The 1990s were characterised mostly by taking stock of our existing resources and developing a framework for steering testing policies and R&D effort. It was a period during which we consolidated and started to build upon the experience we gained in the 1980s. A range of new executive tests was introduced which included the Critical Reasoning Battery, Spatial Battery and tests of capacity; the cost effectiveness of 'test-retest' over a single test opportunity was examined (Bradshaw, 97b) and the second and third generation computer-based test systems were introduced. Each new computer system was purpose-designed, drawing on the lessons learnt from its predecessors, and took advantage of the latest available advances in information technology. This policy has in turn meant that the development potential available within each system was maximised at the time of installation. The latest system, installed in 1999, will allow us to develop tests to probe a wider range of aptitudes by exploiting system capability to deal with auditory, animated and three-dimensional presentations. The 'Domain Centred Framework' has highlighted areas requiring R&D effort such as measurement of learning



rate, ability to work with dynamic spatial information and ability to deal with a combination of aural and visual stimuli demanding more than one form of candidate response.

Since 1955, the RAF has assessed its candidates' suitability for officer training by simulating scenarios reflecting the requirements at initial officer training. The scenarios provide a platform on which candidates can reveal, first, their potential to lead a team and, second, their ability to solve practical problems using logical reasoning skills. The first is normally known as leadership qualities and the second can be considered as "effective intelligence (EI)" which is similar to Dörner's operative intelligence (79, 86). EI takes into account demands on leaders, such as having to produce innovative ideas and problem solving. It recognises the direct interaction of personality with behavioural responses, the need to measure cognitive-intellectual demands and stress resistance. This dimension is different from traditional measures of intelligence factors in that it is widely considered to be a behavioural response which can be assessed objectively during 'assessment centres' situational exercises (Dörner & Kreuzig, 83; Putz-Osterloch, 85). RAF officer candidate performance is rated by a group of trained assessors. Although the ratings are effective and predictive of training success, there are always elements of subjectivity and varying standards between assessors (inter-rater reliability) which tend to reduce assessment reliability assessment. Moreover, assessors' initial ratings of candidates' might be affected by the 'halo' effect, an overall evaluation of whether the candidate is good or bad (Bailey, 94).

A more objective, alternative way, of assessing EI and other similar kinds of performance (such as risk orientation and decision making style) might be to use computer assisted tests. If this line of research is pursued, real life scenarios, such as project planning meetings, can be simulated using computer technology to represent 'virtual' players with whom a single live candidate could interact. Tests could be developed that would be adaptive and interactive so that each candidate's responses would determine the information presented during the test and so determine the way he or she moves through each exercise. We hope to start work in this area during the new millennium.

### Overview

The RAF has made great progress in its aptitude testing policies and in the quality and range of tests it uses. Most test batteries are now driven by detailed analyses of training requirements and can therefore be tailored to each role for which an aptitude testing service is provided. The information technology available to the RAF since 1985 has enabled test research and development to proceed at a rate that is very much greater than was possible before its introduction. We anticipate that further advances in information

technology will enable even greater advances in aptitude testing techniques to be made in future. In addition, the psychology department has now been firmly established as the sole professional support to the OASC and is co-located with the testing system. This means easy access to data, less chance of corruption in data transmission between locations and vastly improved communication between selectors, trainers and the department. We are therefore able to be more responsive to customer requirements and provide a more efficient test development and monitoring service than was the case previously.

### References:

- Bailey, M. (94). An evaluation of PQs. DofR&S Psychologist Report - MOD Report(unpublished).
- Bailey, M. (95). *Fighter controller task analysis study*. DofR&S Psychologist Report - MOD Report (unpublished).
- Bailey, M. (96). *A cross validation study of the controller's test battery*. DofR&S Psychologist Report - MOD Report (unpublished).
- Bailey, M. (97). *Air traffic controller task analysis*. DofR&S Psychologist Report - MOD Report (unpublished).
- Bailey, M. & Woodhead, R. (96). Current status and future developments of RAF aircrew selection. *AGARD conference proceedings 588: Selection and training advances in aviation*, (Nov 96), p.8-1 to 8-9. NATO.
- Bradshaw, J. (93). *Navigator selection process: exploring the navigator test battery*. DSc(Air) Report - MOD Report (unpublished).
- Bradshaw, J. (95). *Fighter controller selection process: rational weight study*. DRA/Customer Report - MOD Report (unpublished).
- Bradshaw, J. (97a). *Test audit: study & analysis 3.0/97*. Eikonica Ltd (MOD Report (unpublished) British Crown Copyright 97).
- Bradshaw, J. (97b). *Aptitude retesting at OASC: study & analysis 1.0/97*. Eikonica Ltd (MOD Report (unpublished) British Crown Copyright 97).
- Burke, E.F. (83). *Computer-based aptitude tests for navigators: initial results*. Ministry of Defence, London: Chief Scientist (RAF) Note for the Record - MOD Report (unpublished).
- Carroll, J.B. (93). *Human cognitive abilities: a survey of factor-analytic studies*. Cambridge University Press, Cambridge.



- D'Arcy, S.H.R.L. (86). Aptitude testing in the Royal Air Force 1939 – 1986. *Air Clues*, Aug, 86.
- Dörner, D. (79). *Problemlösen als Informationsverarbeitung*. Stuttgart: Kohlhammer.
- Dörner, D. (86). Diagnostik der Operativen Intelligenz. *Diagnostica*, 4, 290-308.
- Dörner, D. & Kreuzig, H.W. (1983). Über die Beziehung von Problemlösefähigkeiten und Maß der Intelligenz. *Psychologische Rundschau*, 4, 185-192.
- Hobson, C.J. (95a). *Pilot selection process: rational weight study*. DRA/CustomerReport - MOD Report (unpublished).
- Hobson, C.J. (95b). *RAF aircrew selection: validation criteria*. DRA/CustomerReport - MOD Report (unpublished).
- Hobson, C.J. (95c). *RAF pilot aptitude test battery: validation against basic flying training*. DRA/CustomerReport - MOD Report (unpublished).
- Hunter, D. & Schmit, V.P. (86). *A computer-based test battery for selection fighter and air traffic controllers*. DSc(Air) Memo - MOD Report (unpublished).
- Putz-Osterloch, W. (85). Selbstreflexion, testintelligenz und individuelle unterschiede bei der bewältigung komplexer probleme. *Sprache und Kognition*, 4, 203-216.

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# Swedish Officer Selection

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## Abstract

The use of psychological methods as an aid to officer selection in the Swedish armed forces dates back to the early 1940's. The psychological examinations at that time were heavily influenced by German methods developed in the 1930's with an emphasis on personality variables. In 1996, a new system was introduced, which is based on the theories of Jaques and Stamp and on the philosophy that the first stage of selection must be directed at deselecting applicants not at all suited for the officer profession, rather than trying to find those best suited. The new system has three main components: A cognitive test battery, a personality inventory and an interview. The test battery, comprising three inductive, four spatial and five verbal tests, was constructed with the aid of confirmatory factor analysis. It is evaluated in independent (orthogonal) factor scores over the three latent intelligence factors G (general), Gv (visualization) and Gc (crystallized), as well as in co-varying (oblique) factor scores over the factors inductive, spatial, and verbal intelligence. The personality inventory was also constructed using confirmatory factor analysis. It has 155 statements that yield five independent factors labeled Subjective Leadership Potential, Inflexibility, Adventurousness, Opportunism and Unreliability. The interview is semi-structured and lasts for about 90 minutes. It results in ratings of the six variables Social ability, Motivation for the profession, Emotional stability, Intellectual ability, Energy and Maturity. Construction of criterion instruments is under way, but so far it has not been possible to assess the predictive validity of the instruments due to the fact that criteria have as yet not been available.

## Historical background

In Sweden, the use of psychological methods in officer selection was introduced in 1944. The ongoing war prevented exchange with psychologists involved in military selection in the belligerent powers, and so most of the methods had to be developed with the domestic resources available. The formalized psychological examination was strongly inspired by German methods used in the 1930's. The most important part was an interview, carried out by specially trained psychologists. As a basis for the interview there was a biographical self-description, a questionnaire concerning interests and personality, a so-called "work curve", situational tests (of social intelligence), an intelligence test, an essay, and tests of technical comprehension.

In 1955 the Institute of Military Psychology (MPI) was established and given the responsibility of guaranteeing the professionalism of the methods used for officer selection. In the aftermath of the 1968 student revolution, however, public opinion against selection procedures grew strong and in 1981 formalized psychological selection was abandoned when a new officer structure was introduced which placed all officers, commissioned as well as non-commissioned, in the same category. In 1991, work started on a new system for

officer selection, which was introduced in 1996. At this time, MPI had been reorganized to become a part of the National Defence College (NDC).

Each single Army unit at the division level and each Navy squadron is responsible for its officer selection, having a selection board of its own. The Air Force has a central selection board that provides service to the different wings of the force, both as regards selection of commissioned officers and of pilots. In the last few years, a total of about 1500 applicants have been screened each year, which is approximately double the number required. The testing and interview procedures take place at the military units involved.

NDC is responsible for the development and validation of the test instruments through its Department of Leadership. The actual testing, scoring, and the interviews are carried out by a central Defence agency, responsible for recruitment and selection to all three defence branches.

Apart from the test and interview results, which are delivered to the selection board by the psychologists, the selection boards also collect information on the applicant from his or her training unit. This information concerns his or her service grades, as well as the opinions of peers and subordinates, which are collected by a conscript representative body at the unit in question.

## Selection philosophy

The problem in the initial selection of officers differs from that in selection situations where one wants to find the right person for a certain, well-specified job. Officers apply for their profession at a young age, and then train and develop within the same organization, often for the rest of their professional lives. The first selection step should aim at identifying and deselecting individuals that are assessed as not having any qualifications whatsoever to become a good officer, rather than trying to find those best suited. The reason for this is the fact that there are hundreds of different officer professions at different levels of the military hierarchy, a fact that makes it necessary to keep a large enough variation among those admitted to the military academies in order to permit successive further selection for higher levels. Later steps in the selection procedure should be aimed at finding the most suitable persons for the next consecutive hierarchical level. In the armed forces there is thus a need for continuous evaluation of the interplay between individual qualifications and organizational demands as a basis for development and promotion.

A method of principal interest for the selection problem in the armed forces has been designed by Stamp (1988). It is based on an organization theory formulated by Jaques (1976), which states that different levels in hierarchical organizations demand different qualities from the employees. From the lower to the higher levels, job tasks change systematically from simple to complex ones, from short-term to long-term, and from concrete to abstract. Freedom of action, responsibility and power grow with each level. To five such hierarchical levels Jaques attaches five qualitatively different cognitive levels of abstraction, defined in terms of "time-span" or planning horizon that seem to possess some degree of generality, and that have been described in areas as different as mathematics (Gibson, 1975), pedagogics (Bloom, 1956), and moral standards (Kohlberg, 1971). Selection instruments for the first selection step must be designed to permit testing of large groups of applicants in a relatively limited time. The selection instruments described in the following are aimed at assessing the candidates' cognitive and personality qualifications for functioning at an academic education level and as an officer on at least the lowest levels in the hierarchy.

## Population

Those eligible as officer candidates form a very qualified population. The formal requirement, equal for male and female applicants, is having been trained as a non-commissioned officer for 10 to 15 months during the compulsory military service. Non-commissioned conscript officers are trained for one of three levels: the company, platoon or section level. They are selected to these levels according to information obtained at the enlistment regarding their intelligence, their leadership potential and their emotional stability. Each year, the best 4 % of the total population of conscripts in these combined qualities are selected for the company level, the following 4 % for the platoon and the next 20 % for the section level. Most of the applicants for the profession as a commissioned officer come from the company and platoon levels. To be allowed to apply, the applicants must also have obtained average or higher military grades during their service. It is therefore safe to say that they belong to the 30 % most intelligent and stable people in the Swedish population.

## The test battery

The test battery was designed at NDC and standardized to differentiate in this highly qualified population of candidates and to measure three intelligence factors: General cognitive ability, general visualization, and general crystallized intelligence. The general ability factor (G), at the highest level of a hierarchy, was shown by Gustafsson (1984) to be equivalent to the fluid intelligence factor described by Horn & Cattell (1966). On a second level in a hierarchical intelligence model Gustafsson (1984) defined two broad factors: General visualization (Gv) is supposed to be involved in tasks that demand mental manipulation of figural information, and General crystallization (Gc) in tasks that demand acquired knowledge, particularly of a verbal nature.

In a military context, the G and Gc factors were supposed to be basic factors for problem-solving and for understanding and giving military orders. The Gv factor, hopefully, would predict the ability to imagine different situations, to understand military tactics, to have control over units in the field, to move units around on the battlefield, and to keep control of a moving enemy unit when your own unit is moving as well.

The tests are presented on a wall screen by means of a computer and a video projector, and the examinees respond by checking alternatives in an

answering sheet. As many as 40 individuals may be tested simultaneously. The test results are sent to the psychologist who will interview the applicant, and are also stored in a data base at NDC for technical follow-up and validation studies.

Introduction of the computer in the testing procedure has many advantages, as compared to conventional paper-and-pencil testing. The test instructions are highly standardized, each item can be given a time limit and all examinees are given a chance to solve all items. It is also possible to separate the presentation of the response alternatives from the presentation of the problem, which

for instance opens new possibilities in the testing of spatial ability (Lohman, 1998). The test battery consists of three inductive, four spatial and three verbal tests. Cronbach's alpha for the tests varies from .62 to .86. For a closer description of the tests, see Carlstedt and Widén (1997).

A nested-factor two-group (males-females) model (Gustafsson & Balke, 1993) was tested under the assumption of one general intelligence factor (G) and two broad orthogonal factors, called Gv (visualization factor) and Gc (crystallized intelligence). The results appear in Table 1.

**Table 1.** The factor structure of the test battery in a hierarchical intelligence two-group model for Males (n=945) and Females (n=122). Factor loadings in bold type are significant ( $p < .05$ )

Test\ factors	Males			Females		
	G	Gv	Gc	G	Gv	Gc
Bongard (ind)	<b>.63</b>			<b>.67</b>		
Rules (ind)	<b>.64</b>			<b>.73</b>		
Series (ind)	<b>.65</b>			<b>.77</b>		
Forms (vis)	<b>.63</b>	<b>.44</b>		<b>.66</b>	<b>.53</b>	
Dots (vis)	<b>.60</b>	<b>.33</b>		<b>.63</b>	<b>.33</b>	
Patterns (vis)	<b>.47</b>	<b>.24</b>		<b>.57</b>	<b>.17</b>	
Rotation (vis)	<b>.45</b>	<b>.40</b>		<b>.44</b>	<b>.40</b>	
Literature (crys)	<b>.31</b>		<b>.71</b>	<b>.34</b>		<b>.74</b>
Sciences (crys)	<b>.39</b>		<b>.65</b>	<b>.42</b>		<b>.65</b>
Technology (crys)	<b>.29</b>		<b>.36</b>	<b>.27</b>		<b>.66</b>
Debate (crys)	<b>.25</b>		<b>.71</b>	<b>.28</b>		<b>.73</b>
Associations (crys)	<b>.40</b>	<b>-.21</b>	<b>.37</b>	<b>.51</b>	<b>-.20</b>	<b>.30</b>

ind = inductive, vis = visualisation, crys = crystallized.

The analysis confirms the three orthogonal factors G, Gv and Gc in both groups. The model's fit to data is:  $\chi^2 = 157.85$ ,  $df = 99$ , Root Mean Square of Approximation (RMSEA) = 0.024.

Individual results are expressed as factor scores that are transformed to stanine scales. In addition to the orthogonal factor solution, the test battery is also evaluated with an oblique solution, where the factors are allowed to co-vary. The reason for this two-fold evaluation is that in the orthogonal case direct comparison between individuals is possible only with respect to G, whereas the values in the Gv and Gc factors can be directly compared only for individuals sharing the same G level. In the oblique solution, however, all individuals can be directly compared with all others in all three factors.

For practical selection purposes, it is recommended to use a combination of factor scores from the two solutions. From the orthogonal solution G and Gv should be used, while the measure of verbal ability should be drawn from the oblique solution. Individuals can then be ranked on general and verbal

ability in order to predict the overall ability to profit from academic studies. Depending on the visualization demands in a specific profession, individuals with a certain factor score on G can then be ranked according to Gv.

## CTI - The Personality Inventory

Personality is of great interest in most selection contexts. Management style as described by Stamp (1988) is closely related to *cognitive style*, a concept on the border between intelligence and personality. It can be looked upon as an individual's characteristic way of perceiving reality, acquiring knowledge and thinking, evaluating and making decisions (Harré & Lamb, 1983; Messick, 1987).

The first six of the eleven scales forming the Commander Trait Inventory (CTI) (see Table 2 below) are intended to assess cognitive style, having Jung's (1971) theory of psychological types as a source of inspiration.

The remaining five scales assess personality aspects presumed essential to the officer profession. *Empathy* and *Leadership Motivation* should be reg-

arded as necessary but not sufficient qualities in leadership, while *Egocentrism*, *Impulsiveness* and *Ethnocentrism* should be sufficient signs of unsuitability for the officer profession, mainly for ethical and moral reasons. Table 3 shows the results of a confirmatory factor analysis of the instrument, yielding five factors. For a closer description of CTI, see its English manual (Carlstedt & Widén, 1998).

**Table 2.** Description of the CTI scales: Number of statements, reliability (alpha), and a representative statement.

Scales	Number of statements	Alpha	Representative statement
Sensation Orientation	15	.88	I seldom miss an opportunity that provides a challenge
Intuitive Decision-making	12	.86	I often see possibilities where others see difficulties
Concrete Thinking	12	.81	Concrete facts are the only things that matter
Abstract Thinking	16	.82	I spend quite a lot of time thinking and reflecting over different things
Superficial Value Orientation	14	.77	I keep up with all new trends
Ideological Value Orientation	11	.85	It is important to formulate your own ideals and to live by them
Empathy	15	.90	I often comfort colleagues who have problems
Leader Motivation	15	.89	I am suited for leading positions
Egocentrism	14	.86	My main purpose in life is to get as many goodies as I can
Impulsiveness	14	.84	I quickly lose interest in tasks that I initiate
Ethnocentrism (ETC)	9	.83	There will be problems if immigrants to a greater extent come to command Swedes

All scales possess a satisfactory homogeneity.

**Table 3.** Confirmatory factor analysis of the CTI scales (n=1176). Factor loadings in bold type are significant ( $p < .05$ )

Scale/Factor	Subjective Leader Potential	Inflexibility	Adventurousness	Opportunism	Unreliability
Sensation Orientation	<b>.50</b>		<b>.49</b>		<b>.23</b>
Intuitive Decision-making	<b>.83</b>				
Concrete Thinking	<b>.48</b>	<b>.43</b>	<b>-.30</b>	<b>.16</b>	
Abstract Thinking	<b>.35</b>	<b>.64</b>			
Superficial Value Orient.	<b>.31</b>			<b>.89</b>	
Ideological Value Orient.	<b>.58</b>	<b>.36</b>			
Empathy	<b>.59</b>			<b>.19</b>	<b>-.27</b>
Leader Motivation	<b>.83</b>				
Impulsiveness	<b>-.22</b>		<b>.51</b>		<b>.52</b>
Egocentrism	<b>.07</b>			<b>.25</b>	<b>.89</b>
Ethnocentrism	<b>-.09</b>			<b>.20</b>	<b>.52</b>

$\chi^2 = 313.7$ ,  $df = 31$ , RMSEA = .09. Factor intercorrelations vary between .00 and -.09.

It is possible to find models with slightly better goodness-of-fit values than the one presented above. The present solution, however, was chosen because of its simplicity and because it was judged to have a higher psychological credibility than the alternative solutions available. Individual results are expressed as factor scores, transformed to stanine scales.

## The interview

Interviewing the conscripts in the enlistment procedure has a long tradition in Sweden, going back to the late fifties. This interview lasts for about 20 minutes; it is semi-structured and results in a rating of leadership potential and an assessment of psychological functioning. The majority of the psychologists performing the interviews have long experience of their work.

In general, interviews aimed at penetrating the personality seem to have low validity. However, semi-structured interviews of the type used in the Swedish enlistment procedure seem to have a relatively good validity (Muthén, Hsu, Carlstedt & Mårdberg, 1994).

The psychologists working in the officer selection system were recruited from the enlistment centers. The interview lasts for about 90 minutes and results in ratings, on 5-grade scales, of the variables *Social ability*, *Motivation for the profession*, *Stability*, *Intellectual ability*, *Energy*, and *Maturity*. The interview manual defines these variables in detail, providing anchors for both extremes of the continuum. A comprehensive rating of *General eligibility* is made, based on the six sub-variables. This final rating is presented to the selection board, accompanied by a short psychological characteristic of the applicant and a rank order of all the applicants.

The psychologists meet regularly to perform rating exercises in order to insure the reliability of their instrument, and to exchange experiences from their work on the different selection boards. The NDC is represented at these meetings to receive feedback on the selection system as a whole and to provide expertise in psychometrics and other theoretical issues.

The psychologists are regarded as a valuable component of the selection system, since they have the opportunity to consider all available psychological information about the applicant and present a synthesis to the selection board.

## Criterion measures

In order to validate the instruments described in this paper, it is necessary to have access to reliable information about the performance of the admitted

candidates, to begin with at the military academies, and later on in their subsequent roles as commissioned officers. Unfortunately, the military academies give only two grades: Approved or Not approved. Also, the report system used for evaluating and promoting officers, although quite elaborated, tends to be inadequate for validation purposes.

In an effort to circumvent these difficulties, an instrument was developed for assessing the competence of military leaders. It was first created in order to assist in selecting officers for promotion to the colonel level, but has later been adapted to be useful at lower levels of command as well. The latest version is being tried out for use at the first stage of officer training, the military academies.

The "colonel" version consists of 38 statements concerning overt leadership behavior. In order to get a so-called 360° assessment, it is filled out by the candidate himself and by one officer at each of his superior, peer and subordinate levels.

A confirmatory factor analysis of the instrument yielded six orthogonal factors labeled *General leadership qualifications*, *Emotional control*, *Relations competence*, *Mental capacity*, and *Intellectual scope*. Factor reliability ranged from .91 to .97.

A first validation of the selection procedure will be made at the three military academies in the Fall of the year 2000.

## References

- Carlstedt, L., & Widén, H. (1997). Officer selection in the Swedish Armed Forces. *Försvarshögskolan, LI Serie R:2*
- Carlstedt, L., & Widén, H. (1998). CTI. Commander Trait Inventory. English Manual. *Försvarshögskolan, LI Serie R:3*
- Bloom, B.S. (Ed.). *Value judgments and dualism in geometry and arithmetic*. Michigan: Mathesis Press, Ann Arbor.
- Gibson, R.O. (1975). *Value judgments and dualism in geometry and arithmetic*. Michigan: Mathesis Press, Ann Arbor.
- Gustafsson, J.E. (1984). A unifying model for the structure of intellectual abilities. *Intelligence*, 8, 179-203.
- Gustafsson, J.E., & Balke, G. (1993). General and specific abilities as predictors of school achievement. *Multivariate Behavioral Research*, 28 (4), 407-434.
- Harré, R. & Lamb, R. (Eds.). (1983). *The encyclopedic dictionary of psychology*. Oxford, England: Blackwell.
- Horn, J.L., & Cattell, R.B. (1966). Refinement and test of the theory of fluid and crystallized general

- intelligence. *Journal of Educational Psychology*, 57, 253-270.
- Jaques, E. (1976). *A general theory of bureaucracy*. London: Heineman.
- Jung, C. (1971). Psychological Types. In Campbell, J. (Ed.), *The portable Jung* (pp. 178-269). Tennessee: Kingsport Press, Inc.
- Kohlberg, L. (1971). In Mischel, T. (Ed.). *Cognitive development and epistemology*. London: Academic Press.
- Lohman, D.F. (1988). Spatial abilities as traits, processes, and knowledge. In R.J. Sternberg (Ed.), *Advances in the psychology of human intelligence, Vol. 4*, (pp 181-248). Hillsdale, N.J.: Lawrence Erlbaum.
- Muthén, B.O., Hsu, J.Y., Carlstedt, B. & Mårdberg, B. (1994). *Predictive validity assessment of the Swedish military enlistment testing procedure using missing data and latent variable methods*. Technical Report, UCLA.
- Messick, S. (1987). Structural relationships across cognition, personality and style. In R.E. Snow & M.J. Farr (Eds.), *Aptitude, learning and instruction. Vol.3: Cognitive and affective process analysis*. Hillsdale, N.J.: LEA.
- Stamp, G. (1988). *Longitudinal research into methods of assessing managerial potential*. U.S. Army Research Institute for the behavioral and social sciences. Technical Report 819, October 1988.

## Metacognitive, Social and Interpersonal Skills and Aptitudes in Officer Performance with Distributed Teams

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*"Les choses simples sont difficiles à expliquer"*  
**Henri Matisse.**

### Abstract

Military services, Police, Fire Brigade, Medical Emergency Teams and various other task cohesive groups require supervisory management to ensure that goals are met in a manner which is flexible, reduces risk, is resource economical, and promotes team development. Many of the military and emergency teams require leadership via mediated communication because different elements of the team perform functions in different locations. There is adequate evidence from research on the use of different types of media, with different rules of interaction, with different groups and tasks that performance varies significantly in process and outcome terms between face-to-face and mediated communication variants (Anderson, Newlands, Mullin and Fleming, 1996; Archer, 1990; Christensen and Fjermestad, 1997; El-Shinnawy, and Vinze, 1997; Hollingshead, 1996a, 1996b; Valacich and Schwenk, 1995; Lim and Benbasat, 1997; Reid, Ball, Morley and Evans, 1997), with performance generally poorer in mediated (non face-to-face) situations.

Analysis of leadership roles in general clearly indicate the significance of insightful management of relationships among team members and their relation to the outside world (Katzenbach and Smith, 1994). The priorities identified by this very early work is identified in short pocket guides (Fleming, 1996; Hardingham, 1995; Birch, 1999; Heller, 1999) and in more academic reviews (Larson and Lafasto, 1989; Hartley, 1997; Belbin, 1999).

The significant issues in leadership are:

- 1) The management of goal orientation.
- 2) Building confidence.
- 3) Managing the resource availability in the team.
- 4) Articulating performance with other teams.

- 5) Create or identify opportunities for human resource use and development.
- 6) Match assets/resources to demands.

This emphasis on relationships and intelligent asset management (human and material) supports the general tenets of this paper which emphasises the need for metacognitive, social and interpersonal skills in effective leadership. Early research such as that of Stogdill (1974) indicated that leaders tended to be more intelligent, sociable, and achievement oriented (internally motivated by their own standards).

This paper recognises the tendency for managers and leaders to be merged into one individual as the downward pressure on military and civil institutions creates flatter management groupings from fewer numbers of individuals. In addition it is acknowledged that both the pace of modern warfare and the need for resistant or robust command and control, results in distributed leadership and management on the battlefield, in the air and at sea.

### Planning and Execution Phases

One can distinguish two phases when leadership is critical in warfare. First, the planning phase and second, the execution phase. In some cases both the planning phases and the implementation phases take place in distributed groups. For example, the crews operating in Allied Force were drawn from a wide range of bases, aircraft carriers and in some cases they flew trans-meridian flights to accomplish their missions.

In other instances, crews plan together and carry out operations in distributed teams who may themselves not be co-located (in different aircraft). Thus, in air warfare teams tasked with Electronic Warfare (EW), Suppression of Enemy Air Defence (SEAD), air-to-air (A2A), air-to-ground (A2G), Airborne Command and Control (ACC), Electronic Intelligence (ELINT), and tankers may act as semi-autonomous teams who must be coordinated at higher levels (Penney, Doke, and



Warwick, 1999) to ensure effective use of assets and to prevent operational errors, such as friendly fire and co-lateral damage.

### Specialist Functions and Leadership

Air warfare teams who perform different functions have specialist knowledge. It has been argued that knowledge drives situated cognition in specialist tasks (Clancey, 1997) and it guides expert performance (Klein, 1997). It has been argued that this specialist capability cannot be re-created by multi-role or swing-role forces as a result of the subtle aspects of knowledge and its relationship to action. Thus, in the Gulf War Wild Weasel assets and specialist ground attack aircraft, like the A10 were invaluable in suppressing enemy air-defences and neutralising armoured ground forces (Isby, 1997; Spick, 1995; Thornborough, 1995).

Whether there are diverse specialised assets or multi-role aircraft in operation it is clear that communication is a requirement for effective air warfare operation (Cook, Elder and Ward, 1997a, 1997b, 1999). It is clear that there are also significant risks of mis-managing communication and interaction in such highly dynamic, time-critical environments (Cook, Elder and Ward, 1998a, 1998b; Cook, Angus, Brearley, and Drummond, 1998; Cook, Angus, Brearley, and Stewart, 1998).

The significance of this diverse range of assets is the need for senior officers and leaders of missions to understand the capability of the different assets available to them. In the United Kingdom the Tactical Leadership Exercises (TLTs) and NATO led Tactical Leadership Program (TLP) are intended to help officers develop this type of knowledge. It is clear that multi-national groups are frequently the only feasible way to assemble the relevant air-assets, with specialised assets generally available only as a result of U.S. participation (Penney, Doke, and Warwick, 1999). For example, electronic warfare with hard and soft kill capability is virtually a unique resource of the U.S.A. with its EA-6 Prowler aircraft and special wild-weasel in a pod F-16s, and many air forces do not have adequate tankers for air-to-air refuelling (Thornborough, 1995; Rendall, 1997).

Without adequate task knowledge officers cannot make the best use of the resources available to them and part of the learning process for acquiring that knowledge may be dependent on metacognitive skills or reviewing and self-monitoring.

The significance of asset management is well illustrated in the rescue of a single airman Capt. Scott O'Grady, USAF, because it involved almost 18 aircraft, 120 personnel, without accounting for the AWACS and reconnaissance aircraft (Rendall, 1997). It is to be expected that the daring rescue of the F-117 pilot during Operation Allied Force was no less complex and

expedited in a shorter time-frame than the six days that O'Grady spent under cover behind enemy lines in the Bosnian Conflict.

### Leadership Training

*"The principal goals of a typical training program are to produce optimal transfer of that training to anticipated post-training environment of some kind. With rare exceptions, then, the goals of training are long-term goals. We would like knowledge and skills acquired during training to be durable, not only in the sense of surviving from the end of training to a later time when knowledge or skill is demanded in a real-world setting, but also in the sense of surviving periods of disuse in the post-training environment itself." Bjork (1994).*

Extracting this task knowledge requires the leader to observe and evaluate their use of assets in exercises, and to monitor the use of those assets carefully in operational deployments. To some extent they will be helped by their peers and by their assessors but the best lessons are inevitably those they teach themselves as the future cued recall is strengthened by their own awareness. This capability to externalise information is based on metacognitive skills. The monitoring of the process and the soliciting of relevant information in a facilitative manner is something which requires good communication skills and effective interpersonal skills. Thus, communication and interpersonal skills will undoubtedly affect the final quality of leadership but they may also affect the duration of training required to meet a criterion as training development depends on the individual facilitating information gathering.

The leader of specific teams needs to ensure that they can correctly envisage the progress of the team in relation to the assigned task or goals, by foreseeing obstacles, facilitating communication, and co-ordinating inputs from different team members. An effective leader does not, however, operate in a vacuum and they need to be capable of seeing the world as others see it. No matter what senior military personnel imagine the goal or task objectives set for teams are socially constructed and the team's interpretation of the goals is strongly influenced by the communication and interpersonal style of the leadership. It can be argued that there is no perfect leadership style, in the singular sense, but a requirement for a fluid, but clearly identifiable shift between appropriate roles.

### Fluid Leadership Intelligence

In perfect teams the leader's role may be vestigial because the team process should be automatic, with no requirement for their facilitative action. Teams who feel they are populated by competent individuals may feel

undermined by a leader who insists on autocratic and centralised decision making.

By contrast, many newly formed or multi-national teams, common in the modern military environment, need active leadership because team actions need to be co-ordinated in the modern highly dynamic and rapidly changing battlefield.

It is clear that part of the leadership ability is to sense, assess and iteratively evaluate the feelings of others in the team to ensure that the style adopted matches the perceived environmental demands and the level of team maturity.

In some cases there is a need to challenge the views of others because they have failed to rationally appreciate the political and tactical significance of their leadership choices. Leaders need to be able to accept such advice and to carefully consider the different perspectives afforded to them by other officers at both senior and junior levels. Cockpit Resource Management or Crew Resource Management, which represents a series of training initiatives in civil airlines to improve social interactions in order to reduce accidents or decrease the impact of accidents addresses related issues. Cockpit Resource Management (CRM) identifies cockpit authority gradients and communication barriers as significant issues in preventing the effective critiquing of plans. In CRM the significance of authority gradients and the possible errors accruing from dismissive attitudes towards other's opinions are well documented. Thus, the sensitive management of Prestina Airport by the UK forces represents a good example of considered action because confrontational action with Russian Troops could have precipitated intra-peacekeeping fatalities. The failure to disembark troops from the *Sir Galahad* and *Sir Tristram*, after a challenge from a junior officer who drew attention to the precarious nature of the ships in open water (Rendall, 1997; Suster, 1997), is an example of failed leadership with catastrophic consequences.

The tendency to stick to a decision already taken reflects a failure of leadership and the ability to self-review and monitor. In many ways this resembles the team equivalent of groupthink and may be a result of similar factors, such as cognitive overload encouraging the tendency to adhere irrationally to plans that help reduce cognitive demands, as a result of the cognitive resource gradient in shifting from skill to procedural or rule-based information processing (Cook and Elder, 1998). It may be argued that one of the critical roles of leadership is to identify changes in operational context that require a shift in the team equivalent of Rasmussen's (1983, 1986) skill, rule and knowledge based processing. This is effectively cognitive and task based resource management, and failure to modify plans represents a form of cognitive overload due to a micro-management style.

Many reviewers agree that groupthink is a potentially damaging process for decision making in that the choices taken may be ineffectively reviewed and evaluations may be false or misleading (Fleming, 1996; Hardingham, 1995; Hartley, 1997; Hayes, 1997; Larson and La Fasto, 1989). If the circumstances in which the decision-making choices are executed are challenging, in that the task requirements potentially exceed the resource availability or their spatial distribution, or the task proves impossible for another reason, then serious failures can occur. There are cases where the management of the available resource has enabled the leadership to overcome significant challenges with positive performance outcomes and others where adequate resources have been mis-managed with poor performance outcomes. In a general sense, the performance failures can largely be attributed to earlier process failures resulting from poor leadership, such as groupthink because of inadequate facilitation of communication or the superficial consideration of the task requirements.

There are many events that require effective leadership intervention, such as unusual or unexpected events, failures by individual team members, equipment failures (particularly communication systems), resource mismatches between demand and available resources due to poor intelligence. These events require an ability to quickly prioritise tasks, resources and goals in relation to each other. The ability to manage such event sequences in distributed teams requires cognitive, cogno-social and interpersonal skills. Team leaders clearly require effective communication and interpersonal skills to ensure that they can monitor, control and re-distribute functional roles via mediated communication. The use of mediated communication in particular involves an ability to adopt the perspective of other team members in response to communication because of the need to generate belief and commitment to changing plans. While these skills can be partly acquired or developed as a skill it can be argued that the ultimate level attained is limited by aptitudes of the potential candidates. The perception of the orders issued and the validity / reliability of the source are frequently inter-related.

The ability to manage a team requires a development process whereby the leader creates an image of calm, confident, considered control which demonstrates insight. Again communication skills are required to develop the isolated individuals into a cohesive team. In addition, the leader is required to self-monitor and review the team's skills and achievements with respect to their input. Interpersonal and social skills are required to appreciate how others perceive and interpret their actions and communications. This ability to understand others and to reflect on oneself is particularly vital because the leader of any team must impose order when uncertainty and ambiguity exist in the operational environment, with respect to actions required or the

information available. It has been argued that some individuals are poor in their use of social knowledge and in their ability to apply metacognitive analysis to their own social or cognitive processes. It is proposed that there are core skills, developed from aptitudes, which are related to perspective taking. It is proposed that these perspective taking skills are in turn important in the appreciation of one's own team performance and in aiding in the development of effective responses to opposition forces, as a result of insight into their strategies. While such skills can be developed it is possible that the constellation of aptitudes, underpinning these skills, may be selected for at recruitment by effective techniques in an assessment centre approach using special exercises.

### **The History of Clearly Identifiable Leadership Traits**

When this abstract was first written by one of the authors it was largely written in ignorance of a literature that is almost forty years old. By good fortune a copy of Wren's (1999) introduction to social influence was purchased and the chapter on leadership was a revelation. The analysis put forward by Wren's book seemed to be in harmony to that put forward in the abstract submitted in the same year and it was in general accord with that in other related textbooks (McIlveen and Gross, 1999). However, there were qualifications to the views expressed in the book, as Wren himself pointed out, because the material presented was drawn from different domains not particularly relevant to that of military leadership. There are those who would and have argued that principles identified in social discourse in other realms can, with some justification, be applied to specific domains. Larson and LaFasto (1989), have produced a book on teamwork, which is based on surveys of teams in a wide range of areas, and claims to have identified common features which appear across domains. Thus, it is clear that leadership can be separated into domain specific aspects of leadership and the more generic characteristics of the leadership role. This type of analysis acknowledges the need for task specialists and socio-emotional specialists to manage the cognitive and social aspects of teamwork identified in earlier research (Bales and Slater, 1955).

### **Wren's Analysis of Leadership**

As Wren (1999) notes leadership is a term which has become embedded in societal language and examples of leadership can be found in sport, business, research and many other domains of human activity including the management of military operations. While agreeing it is difficult to define it is clear that an absence of leadership or the presence of effective leadership can generate significant differences in performance outcomes.

There is no doubt that many early studies focused on the individual as a source of leadership ability and they found that need for achievement, motivation, and

intelligence were commonly factors that differentiated great leaders. However, subsequent analyses have failed to validate these early observations on greatness and many of the correlations were found to be weak. As Wren (1999) notes people frequently commit the fundamental attribution error in associating the personality attributes to explain an individual's success.

The attempts to identify observable characteristics of leaders largely continued the search for qualities or types of leadership. Wren (1999) notes that sociological analyses suggest that authority comes from rational, traditional and charismatic features of the person or their position. In the simplest terms, those following leaders see their actions as legitimate and socially accepted. Charismatic influence over others largely applies to cases where individuals idolise the leader as some superior intellect. In military terms the traditional and rational aspects of leadership make sense but the charismatic does not. There are real dangers in military teams blindly following the directives of their leader because the leader may fail to make the correct judgement. When the *Sir Galahad* and the *Sir Tristram* were caught in open water with troops on board it was a clear error of judgement on the part of the commanding officer and it is generally acknowledged that the British Forces were very lucky to achieve the overall results they did despite such errors of judgement. In such a context a boat is extremely vulnerable to attack. The possession of Exocet missiles and the damage inflicted to HMS *Sheffield* should have made the officers more wary even though many of the attacks were pursued with inferior iron bombs. Indeed, the results of the Argentinean attack on the British ships would have been much worse had many more of the iron bombs not failed to detonate.

### **Perception of Leadership and Attributions of Authority**

It is possible that leadership presents the same philosophical conundrum as colour does in visual perception. Colour does not really exist as an attribute of objects because the surface qualities are determined by absorption and reflection of light (Thompson, 1995). By the same token leadership is something that others perceive in an individual and it does not seem to simply be a quality of the person. With regard to the colour of objects the spectral quality of light incident on any surface may actually change the pattern of light emitted but we perceive the colour as relatively constant. By the same token an individual can command authority and respect in certain circumstances but their appearance may change in different contexts. Again it is only the constant perception of senior figures as authoritative which maintains their control.

### **Social Skills**

It has been proposed that social skills are significant in managing distributed groups because sensitivity to the

use of language may be the only cue as to the state of teams separated in space. Bales and Slater (1955) identified two categories of leaders from small discussion groups which they termed task specialists and social-emotional specialists. As Wren (1999) notes the basic categorisation identified by Bales' results was supported by later studies by Fleishman (1973) in which it was found that two categories of leadership were apparent:

- initiating - goal and task-orientated.
- consideration - relationship-oriented.

Analysis of results does not clearly establish the dichotomous partitioning of the skills in both leadership styles. Some studies suggest that the categories are mutually exclusive and any individual cannot exhibit both styles. Other studies suggest that while the axes are not statistically orthogonal they are independent enough to allow individuals to score high on both, low on both or high on one and low on the other, or low on both (Blake and Mouton, 1968).

Bass (1990) reviewed the literature and concluded that different styles are more or less likely to be the more effective in different contexts. Autocratic styles are more effective in authoritarian environments where followers are expected and look for a leading figure. Task-orientated leaders are found to be more effective in environments that are either favourable or unfavourable to the group goals. In warfare the context may rapidly change and an effective leaders have to change their style of leadership and communicate that change in intent and authority to their team. If leadership remains rigid and inflexible there are many dangers and pitfalls awaiting the unwary.

### Metacognitive Social Skills

"O wad some Power the giftie gie us,  
To see ourself as others see us !  
It wad frae monie a blunder free us,  
An' foolish notion"

Robert Burns (1786) in *To a Louse*

"O would some power the gift to give us,  
To see ourselves as others see us !  
It would save us from our own mistakes,  
And foolish ideas."

English Translation from Scots version of  
Robert Burns (1786) in *To a Louse*.

Robert Burns clearly identifies the importance of seeing ourselves as other's see us and it is clear that effective leaders cannot simply direct without knowledge of how others perceive them and their actions. A good leader must be aware of the image and the message communicated to their team or unit. Failure to be sensitive to the affective, cognitive and perceived quality of the team commanded can easily result in poor or

inappropriate resource management, hesitation, decision-making paralysis and many other behaviours that are potentially catastrophic in the fast paced modern war.

The importance of monitoring and reviewing one's own behaviour, cognitions and their effects on others seems fundamental to the leadership role. Reviewing and monitoring are equally important in sustaining and maintaining effective team performance and behaviour (Belbin, 1999; Fleming, 1996; Hayes, 1997). Any leader with this ability is likely to command significant respect and exert significant control over their followers. However, the power of this improved self-awareness extends beyond the realms of simple interpersonal skill improvements.

First, it has been shown that the behaviour of individuals contributes significantly to the perception of their leadership qualities by others. Any self-awareness of their own impact on others and the ability to refine those skills, through self-review and monitoring, would significantly increase their confidence and this in turn could improve their presentation of their leadership abilities. This ability is well described in the quote from Robert Burns above.

This improvement in performance would not be sustained without sensitivity to the reactions of others because situations may change and require a flexible response to each new set of circumstances. A rigid inflexible style may be highly predictable but it is unlikely to inspire confidence from others. This is something which is analysed at a later point.

### Communication Skills

It is clear that language presents many problems in terms of ambiguity, its verbosity, and the multi-level analysis that is required to extract meaning. It is all too easy to believe that we rarely make mistakes because the mechanisms of repair are built into the dialogue process itself. However, careful analysis of accident reports and of communication suggests that it may contribute to a significant degree in accident development or occurrence (Cushing, 1994).

Communication has been identified as highly significant in many reviews of human factors in military operations (Huey and Wickens, 1993) and it is clear that it forms a core element in effective Crew and Cockpit Resource Management - CCRM (Kanki and Helmreich, 1993; McCallister 1997).

Given the importance of linguistic skill in communicating the *clear elevating goal*, identified by Larson and LaFasto (1989), as a significant factor in effective team performance it is not surprising to find that communication skills are considered vital. It is possible that communication skills are more important in

teams that work in distributed planning and execution environments where mediated communication takes place as some analyses suggest (Cook, Angus and Campbell, 1999). Indeed, in reviewing mediated communication Mantovani (1996) suggests that:

"The model of communication as information transfer does not take into account the cooperative component, which stimulates reciprocal responsibility for successful interaction and a series of subtle adaptations among interlocutors." Mantovani (1996).

Mantovani (1996) goes on to suggest that:

"The new, alternative concept, which is emerging with increasing clarity, is that communication is a common construction of meanings (Kraut and Streeter, 1995)".

Mantovani (1996) continues stressing that the belief that communication is a body of information, containing objective facts, is effectively a falsehood, because receipt does not guarantee comprehension. Accepting this basic fact is the key to accepting the significance of effective communication which can generate highly significant task failures in cooperative tasks that are common in military environments.

We are indebted to Raphael Pascual (1998) for the following anecdotal example observed in army personnel. In an experimental task, managing a difficult and uncertain situation an officer in a simulated communication cell failed to pass on information to a senior officer and when the situation started to degrade rapidly the officer passed on information. Thus, the next highest-ranking officer in the chain of command was presented with a very difficult situation for which they had poor situational awareness. This resulted in a poor outcome and this can be partly attributed to poor communication, low levels of sensitivity on the part of the officers concerned and poor interpersonal skills. The junior ranking officer was concerned about their image in the eyes of the senior officer and wanted to appear competent by managing the situation. The senior officer had not established a facilitative and confident relationship with their junior officer which reinforced the concerns of the junior officer. The senior officer failed to monitor and review the relationship so that as the problem situation worsened they had not proactively solicited communication from the junior officer.

These anecdotal reports can be supported by ample evidence in the cockpit voice recorder literature (Macpherson, 1998) and by analyses of specific incidents such as the Tenerife Crash (Cushing, 1994; Beaty, 1995) which indicate the potentially high costs of communication failures, which are often associated with poor quality leadership.

It must be remembered that self-review and monitoring are a significant part of maintaining communication skills which may be subject to the fluctuating and uncertain effects of fatigue (Graeber, 1988) or stress.

### Affective Management

An important element of the interpersonal skills and communication repertoire is the management of failure and learning from mistakes (Hayes, 1997). Leaders are often required to trap failures or identify errors, before they result in significant negative outcomes, but they must take care to avoid undermining the confidence of the team or lose overall situational awareness by micro-managing the task in progress. In addition, when failures occur leaders must identify the problems and guide the team to prevent recurrence. In managing the failure or the prevention of failures leaders clearly need to be sensitive to the emotional response of their team members. At the same time leaders need to instil confidence and not to appear vacillating, or the team morale will disintegrate. This paradox of strong, silent leadership with minor exceptions underscores the fluid nature of leadership because there are clearly times to be silent and times to be outspoken. Leadership which fails to identify those periods in which their team needs verbal support or who interrupt unnecessarily.

Another aspect of the affective management identified as a core element of leadership is never ignoring shortfalls in team performance (Hayes, 1997). Again this requires sensitive handling to ensure that those contributing to the failures or shortfalls are informed of the problem. An important part of the process of effective leadership is the recognition of a portion of the blame in relation to the management process openly accepted by the leader. This open acknowledgement of under-average performance is a part of the RAF culture which has been established to improve operational performance and to increase flight safety in peacetime training. Open communication of this type can only occur when the response of the leadership is not guaranteed to be retributive or vengeful. Many analyses of effective team performance identify open communication as a relevant factor in good team performance (Fleming, 1996; Hayes, 1997; Hardingham, 1996; Hartley, 1997; Wren, 1999).

A significant factor contributing to communication performance of groups is the leadership style. It has been argued that leadership style is part of a trait-based approach to selection which fails to identify significant exceptions to the general selection criteria (Jennings and Watson, 1994). It is clear that the current proposal for emphasising social, communication and metacognitive skills could be seen as subject to the same criticisms. However, the approach put forward here is one which recognises flexibility of leadership style as an important additional caveat. This flexibility would allow the adoption of an appropriate style to suit the operational

context. This flexibility would be an important part of the metacognitive skills which the effective leaders possess.

### **Leadership Style and Team Performance**

The importance of flexibility is demonstrated by a relatively old series of surveys (Fleishman 1973) in which two categories of leadership were identified:

- Task/Goal-Orientated.
- Relationship Orientated.

Bass (1990) followed this earlier work and found that different leadership styles occurred in different environmental contexts. Autocratic leadership styles were effective in authoritarian environments but task-orientated leaders were better in uncertain environments. A critical question which is still alive in the management literature is the exclusivity of the management styles. Other analyses have identified important interactions between the leader and the sub-ordinates. Fielder (1971, 1981) identified three factors contributing to effective leadership:

- Leaders Relationship to Followers.
- Task Type.
- Leader's Power.

A key element of the military environment is the way in which the relationship between leaders and sub-ordinates and the leader's power would remain constant, while the task type or mission varies depending on the context.

As Wren (1999) notes the degree of uncertainty in the task and the definition can vary. This has commonly been acknowledged as a problem in peace-keeping, United Nations and humanitarian missions where the military are deployed. It is clear that the mixture of different cultures in one team, as is often the case in peace-keeping operations, puts significant social and cognitive demands on the leader of such teams. The military and social cultures of the respective forces may differ greatly, as may the behavioural mores and customs, which may in turn influence the credibility of leadership. The degree of liking and respect are significant in team management by a leader, this is a major problem for distributed groups, in that it is hard for a leader to establish an effective image for the team. The final element is the power of the leader and as Wren (1999) acknowledges the military leaders have considerable power. This cannot be immediately reconciled with the likely threat from a formidable enemy defence but it may maintain team performance in normal operating conditions.

As Wren (1999) notes the different leadership styles are suited to different situations and given the possible variety of operational contexts it is important to have a flexible leadership style in which changes between

scripts are adequately signalled to sub-ordinates. Some may argue that it is important to maintain distance between the leader and the team. Maintaining distance may only serve to emphasise authority gradient and increase the likelihood of poor communication in distributed teams.

### **The selection of the modern military leader (An example)**

Selection has always been a difficult task. Especially when leadership-traits are the subject to be investigated. It has become clear, that the tasks and therefore the demands made on the modern young officer have not become simpler. In fact, the tasks have become more complex, the function of the young officer has become more complex, the risk of failure has become greater and the number of potential officer-candidates has decreased (McKinsey, 1999). This hiatus in expectation has coincided with a period in which the domain roles are more uncertain because of the changing usage of the armed forces in humanitarian and peace-keeping roles, with there uncertain rules-of-engagement and vague or uncertain interpretations of command intent and authority. All of these factors contribute to the fact that the selection-process of young officers has become more demanding as well. It can be argued that many of the traditional methods for officer selection need to be revised in light of these changes in requirement.

First, it is of great importance that it is clear what tasks the young officer will have to perform once on the job but this is now uncertain and subject to change. A proper and thorough analysis of the function is vital to every selection-process and this case is no exception to the rule. As been suggested in this paper so far aspects such as flexibility, decisiveness, task-oriented leadership, people-oriented leadership, social and communicative skills are important to the ensure the best performance of young officers in the modern military environment. Selection and training cannot work miracles in developing these abilities but the current limits of improvement are ill defined. The selection process itself aims mainly to filter out those undesirable or unsuitable elements from the applicant group. Training is intended to create an effective fighting force from the raw recruit and to continue the process of selection by identifying those individuals without the appropriate skills, knowledge or attitudes for the ultimate role. A major issue concerns how much training can modify the raw recruit because many armed forces work on the assumption that their system can mould the new recruit. It is possible that a mis-match may occur in the type of individual which passes the selection system but who is inappropriate for officer selection, so called 'false positives'. No matter how effective the training is it may be impossible to convert the new recruit into a usable officer through the process of training. Evaluation of this process is currently weak because of the inadequate understanding of the new roles required of the recruit



and the relationship between training methods and outcomes.

Because the demands made of leadership are build up around two aspects, the personality-traits and the way those traits are used in practice, the selection-process should also be aimed at those two aspects of personality. Selection tests theoretically measure the potential of an individual but they can be misleading or incorrect. An individual may not exercise their personality traits in their behaviour, because it is measured by questionnaire. The absence of the personality in their actual behaviour may occur for a number of reasons and this is the basis of many criticisms of the trait models of personality (Brunas-Wagstaff, 1998) based on situational or contextual factors.

In the personality assessment commercial airline pilots a similar selection method is being used. This method consists of three parts:

- a) Personality-assessment by using personality-questionnaires.
- b) The assessment centre method (ACM).
- c) An Interview.

Each of these methods has clearly identifiable weaknesses that have been reviewed in the academic literature but together they represent a strong and effective method (Cook, 1998). The authors are particularly critical of the cheap and quick methods which lack task analytic validation in relation to the role or job-function that have been adopted by the more commercial organisations. The significance of the functional demands in determining the effectiveness of a leader was also stressed in Bales (1950) early analysis. The same general view was re-iterated by Fiedler (1964; 1981; Fiedler and Chemers, 1984) who highlighted the importance of the personal characteristics of the leader in relation to the contextual requirements of the group's operational domain. It is felt that the method adopted must be empirically validated by performance monitoring of the selection and training system through an accurate auditing process. If there are no empirical validations of the process used it is likely that litigation may follow failures to select certain individuals, as has occurred in the civil sphere (Cook, 1998).

#### A. *Personality-questionnaires.*

First, one should perform an appropriate personality-assessment by using validated personality-questionnaires with appropriate levels of predictive validity. There are a great variety of questionnaires, but the general problem is the poor predictive validity of those tests (.15 to .20). This might not be a problem though, if the personality test is used in combination with other instruments of assessment of personality (like ACM and interview techniques). Another factor to take into account, is the cultural bias of personality assessment. Considering the fact that the young officer is quite likely

to be involved in international operations, like UN-peacekeeping missions, it is wise to choose an internationally used and validated personality questionnaire.

The personality-questionnaire will only be used to assess the way in which the candidate thinks he or she has the possession of certain personality-traits. The danger with the self-report measures is that they are subject to bias because the candidate may respond in the manner they think is appropriate and not as a genuine reflection of their nature. The ability to exercise the traits in skilled social behaviour requires procedural assessment of the individual using the ACM. It is likely that procedural assessment of traits is more difficult to measure accurately in a short time but less subject to faking.

#### B. *Assessment Centre Method (ACM).*

Once the personality-assessment is finished, the procedure can be focussed on the way the candidate practices leadership. An ACM that makes use of job-samples is a powerful tool to assess these abilities in practice. The critical factor is the validity of the job-samples. The more the job-sample is similar to the real life situation the more likely it is to be a valid predictor of success on the real job. However, many jobs require domain expertise and it is frequently difficult to take raw recruits with no expertise and provide a rigorous assessment of their likely ability in successfully tackling the actual role.

There are several ways to assess leadership-practice. First, there is the group discussion, in which the candidates have to discuss about a certain subject of their choice. This does not have to be the case, it is also possible to give them a subject to discuss about; it may give the assessor more control over the sort of discussion there will be. If the candidates pick out their own subject they can demonstrate their ability to convey knowledge in a personal area of expertise, as one might hope they would do in military operations after training. If the candidates are given a novel topic to discuss and one which is antagonistic to their own views it may be possible to examine their ability to imagine themselves in their future opponents situation. In addition exercises without preparation help to assess flexibility of thinking styles that is vital to the fast pace of modern warfare. They will be confronted with other candidates who all will have their own views and opinions, there may also be confederates of the assessment centre. In this situation personality aspects like social and communicative skills and personal aspects like decisiveness and assertiveness are important for the way the candidate will perform in influencing the group. It should be remembered that even though officers are in positions of power the perception of the task and the team role in accomplishing the task is a socially negotiated and constructed enterprise. Thus, it is clear that given the social construction of reality the leader must be persuasive because this is the characteristic that

will largely determine the creation of an agreed common goal. This discussion will enable selectors to determine if they can cope with the opinions of the other candidates and how will he or she be able to stress the advantages of their opinions with their communicative and persuasive skills. The behaviour of the candidate should be assessed by psychologists or specially instructed senior officers with a scientifically developed rating or observational methodology. There are real dangers in allowing naïve or untrained personnel to make judgements as they may be influenced by other irrelevant factors. The observation method should be targeted at the qualification and quantification of the behaviour that has been shown to be relevant to the final post. Assessors will use scoring-forms that are made in advance and are based on the analyses of the function the candidate will get in the future. In addition, each additional exercise will only test a limited number of features to prevent the raters being overloaded with the factors they are assessing in the candidates behaviour and to provide more accurate measures of the specific factors assessed in each phase of testing.

The second exercise that can be used to assess leadership behaviour is the performance of a group-task. This exercise can be carried out in a classroom, but also in the field (to make it look more realistic and to add stressors). In fact the possibilities are plenty, as long one takes into account that the prediction of future leadership-behaviour potentially becomes more accurate when the test-situation shows more resemblance with the real situation. The group-task can be made as complex as one desires, or it can be changed half way through solving the problem in to an other problem or goal to be achieved, in order to see how the group-leader can anticipate and react with flexibility to the new situation. Flexibility and management of uncertainty are widely recognised as important features of military leadership. It is also possible to manipulate the assets of the group or the means of communication for instance by only allowing communication to take place by radio, telephone or e-mail. Mediated communication is the norm in military operations and the luxury of face-to-face communication cannot always be afforded. In this exercise it is of great importance to carefully observe, quantify and qualify the behaviour of the candidates. The assessors, as has been stated earlier, should be specially trained psychologists or specially instructed senior officers. There is a great danger in believing that subject-matter experts (SMEs) can simply walk in and identify the features that make their performance effective. As is well documented skilled performers rarely have access, through introspection, or self-monitoring to the factors that make them good in their role.

### *C. The interview.*

The third and last part of the procedure will be an interview. In this interview the vision and motivation of the candidate in respect to leadership-traits can be

subject of examination. In order to avoid socially desirable answers by the candidate, the criterion-related interview might be a useful tool. In this type of interview the candidate will have to accompany his answers with examples from his every day-life experience. The speed and confidence of the answers gives some indication of truthfulness of the answers but care must be taken to exclude psychopathic individuals. The authors are indebted to a Clinical Psychologist from the RNLAf for pointing out that many of the features desired in candidates are also present in psychopaths. Thus, Cleckley's (1964) list gives:

- 1) Superficial charm and good intelligence.
- 2) Absence of nervousness.

These are key features that would result in psychopathic candidates being included in a sample suitable for leadership. However, subtle features such as:

- 1) Poor judgement.
- 2) Failure to learn from experience.
- 3) Unreliability.
- 4) Untruthfulness and insincerity.
- 5) Specific loss of insight.
- 6) Unresponsiveness to interpersonal relations.

Which are also aspects of psychopathy are not advantageous in officers on the battlefield for obvious reasons.

The answers that the candidate gives, will give the interviewer enough opportunities to form a good picture of the leadership ability and motivation. It may not in and of itself allow the naïve observer to identify potential psychopathic candidates. However, the rigorous assessment process may be sufficient to raise doubts about a candidate's suitability.

Once these three stages of the procedure are done, the most important part of the selection procedure will take place: the construction of the selection result. In a meeting with all the assessors that are involved in the selection-process, all the measured data will be brought together and the end-scores will be calculated over every behaviour-aspect that has been observed. This will be done by using a specially made table of behaviours assessed by every exercise in order to structure the meeting. The scores will be averaged, if desired by using weights for behaviours that are found to be very important. The pattern of weights should be deduced from priorities derived from observational assessments of good and poor officers, subject-matter-experts and from empirical studies. In the meeting the assessors can exchange opinions about the candidates they have observed.

The goal of the meeting will be to make a leadership-profile of the candidates, that is based on the opinion of



the candidate himself about his leadership-traits (personality-questionnaires), the effectiveness and efficiency of his leadership behaviour in practice (ACM) and the impression the candidate made on a professionally skilled interviewer in respect to his leadership-traits.

The example that has been described here makes it possible to get a good picture of the leadership-abilities of a candidate and to make his stronger or weaker points visible. In respect to the weaker leadership-traits, this can be used to build a tailor-made training program for the candidate if possible. However, given the emphasis on cost in training regimes it may be better to adopt a strict criterion and too exclude any doubtful candidates requiring extensive training. Indeed, it may be argued that those candidates who have not successfully developed the appropriate characteristics in the normal course of events are unsuitable because of their relatively low levels of self-knowledge.

There are of course disadvantages in this selection method. It will take a lot of time to prepare for the selection-process and to carry it out. Therefore, the process is very expensive but so may be the consequences of selecting the wrong type of candidate. On the other hand the predictive validity can be better than using personality-questionnaires and interviews alone which do not give sufficient insight into procedural aspects of skill and one should take into consideration the costs involved when the wrong candidate is being trained and the catastrophic costs associated with leadership errors in warfare. It is especially important when more measurements and tools are combined because the overall picture of the abilities of the candidate will be better. It should be remembered that repeated measurement will tend to reduce sampling errors in a mathematical way which approximates to 1 over the square root of the number of samples. Thus, repeated measures are invaluable to increase the accuracy of the assessment procedure (Cook, 1998).

As is always the case with any selection-process, a 100 % correct estimate of the future success of a candidate in a certain job will never be possible but the current levels of predictive validity suggest there is significant room for improvement. One can only try to reach for the best solution both in respect to the candidate's future and the effectiveness of the organisation.

## Conclusions

Leadership traits identified in this paper deviate little from those hypothesised by other researchers. For example, Kirkpatrick and Locke (1991) and Stogdill's (1974) combined list includes factors such as:

Cognitive Ability, Task Knowledge,  
creativity, flexibility, adaptability,  
independence, self-confidence.

This mix of cognitive and social ability is widely recognised in many papers and reviews, even though the application of trait approaches to selection is somewhat problematic and the predictive outcomes are not astoundingly high (. What is different in the current proposal is the association of superior abilities in metacognitive, social, interpersonal and communicative skills which are required to overcome the vagaries of distributed and mediated communication in military environments. It is argued that the increasing pace of warfare and the powerful capability of the assets used requires distributed command and control. Thus, leadership must be executed outside the face-to-face network of interactions for which people are highly practised and extremely knowledgeable. This separation of command authority and implementation authority is of critical significance to leadership skills in the areas outlined.

Distributed command and control requires the promotion of confidence in the team, the clear communication of task goals, the development of plans, the management of assets in a dynamic environment and the sensitivity to recognise and resolve doubts among team members. Analysis of mediated communication suggests this is not simply the duplication of normal exchanges which occur in face-to-face interactions (Mantovani, 1996; Cook, Angus and Campbell, 1999). This difficulty in automating and computerisation of organisational systems has been studied for some time (Jones, 1995) but with greater interests in more recent times. So far it is clear that technology is simply not the answer to human process issues because the individual brings to the technology the skills they have developed elsewhere. Skills are highly application specific and they may not be useful in mediated communication environment. In all aspects cognition is situated within a social and organisational context which drives the way that interactions take place via technology (Mantovani, 1996). Early textbooks such as that of Scrivener (1994) gave clear indications of the likely problems with the new mediated communication and the indication that interactions via the technology required a new set of skills layered on top of those normally applied to dialogue management in face-to-face exchanges.

The significant impediments created by distributed teams and resources are recognised in the popular management textbooks (Fleming, 1996) who suggest that reminders of goals, promotion of team vision, encouraging communication and effective time management are critical leadership skills in such situations. In addition, it is stressed that a suitable method of working is developed to enable distributed working and that requires evaluative judgements and insight on the part of the leaders. For many this is what new software initiatives are intended to resolve but so far many of these initiatives have been spectacular failures as a result of ineffective leadership (Martin, 1995; Mantovani, 1996). It is clear that even where technology does not mediate the relationship between

people it can subvert normal relationships because it draws attention away from normal social interaction (Greatbach, Heath, Luff and Campion, 1995). The same diversion of social interaction has been observed in cockpit systems (Sarter and Woods, 1994; Mosier and Skitka, 1993; Bowers, Oser, Salas and Cannon-Bowers, 1996).

Thus, it has been demonstrated that organisational practices can interact with new technological capability to produce both negative and positive outcomes (Blackler, 1995; Woods, Johannesen, Cook and Sarter, 1994; Goguen, 1994; Hollnagel, 1993).

### Postscript

It was obvious in the light of the response to the oral presentation of the paper in discussions and the questions posed directly in response to the presentation that many of the audience failed to grasp the underlying thrust of the paper as presented. Much of the aim of the proposed changes to the selection mechanisms and early assessment processes are a reflection of changes in the real-world operational problems that were largely overlooked in other presentations delivered at the conference.

The first great change is the rapidity of modern warfare and the power of the weapon systems which require coordination at a lower level. This has been recognised in the recently published work of Vandergriff (1999):

"The culture must adjust its course before the army can execute the high tempo and rapidly changing warfare of the future."

Vandergriff (1999, p. 240).

And:

"In the future, war may be short and intense and require important decision making at many different levels of command. Much depends on proper planning and preparation to ensure that leaders and their units can perform in the best possible way during the initial days of combat."

Vandergriff (1999, p. 241).

The second change is the politicisation of warfare in humanitarian missions organised by the UN and more recently in the actions of NATO in Operation Allied Force. There are many reports confirming the general trend towards the possibility of high level interference (Hewson, 1999):

"too many politicians and high-level commanders had to give their authorisation to the ATO and asked for the smallest details to be supplied."

Lt. Col. Paul "Horse" Mulder (1999, p. 54).

Officers in the field, at sea and in the air must be aware of these issues to act within the appropriate mandate and with the acceptable level of risk related to co-lateral damage and blue-on-blue kills. Thus, in allied force there were early suggestions that mistakes were made, with a wingman shooting away the tail of the lead pilot in error (Hewson, 1999) and later in the conflict civilian casualties in the train crash after a bridge was hit and the mistaken attacks on fleeing refugees in a tractor convoy. These errors created significant tensions within the NATO coalition and awareness of these higher level issues at lower levels, where the actions are implemented is vital. It should be noted that speed is a vital factor in military success (Leonhard, 1999) and this is generally agreed by many authors of operational analysis textbooks on warfare. In Allied Force, the issue of speed is well illustrated by the tasking of a cruise missile by a U2 reconnaissance unit onto a MiG-29 on an airport runway (Hewson, 1999). Even if this was a wooden dummy the devastation of all such targets, real or fake, would have had a significant effect on Serbian morale, underlying the use of speed and power as a potent shock weapon in the modern battlefield, as military analysts have suggested (Bateman III, 1999).

Overlying the issue of politicisation of the battlefield is the requirement to increasingly use multi-national assets to pursue warfare because no single nation has the capability or the political mandate to pursue individual action (Penney, Doke and Warwick, 1999). Thus, officers need to work in a diverse multi-national environment and recent reviews suggest that planning in these environments is less than effective (Mulder, 1999).

In addition to the changes in the modern battlefield many of the audience seemed not to have considered the recurring issues in warfare.

For example, the first goal of any warfare group is to attack and destroy the communication, command and control elements of the opposing forces, which means that effective warriors can quickly re-organise and re-group around a new leader. As an example of this in the Operation Allied Force it has been suggested that the Serbs sought to attack a JSTARS or an AWACS aircraft to undermine the Airborne Command and Control Structure (Hewson, 1999) and in-directly degrade the effectiveness of the air warfare elements in combined operations. Whether this was the case or not this type of action is one of the most fundamental aspects of warfare in the air, at sea or on land. Thus, one must select officers that can show leadership under such difficult conditions and these represent the acid test of leadership measured in leaderless groups. Those situations in which individuals are nominated as a leader, after a short period of acquaintance could be useful as well, because of the increasing requirement to establish rapport across multi-national forces. The fundamental point is that selectors must address the changing requirements in the

operational domain or they will select individuals who are obsolescent or inappropriate prior to training or deployment. It is clear that the current predictive validity of many tests is remarkably low suggesting that the requirement is poorly understood, the tests are inappropriate or both are the case.

With increasing downsizing in most military forces the room for error is narrowing because most cannot afford to allocate training budgets to inappropriate candidates or they must accept a lower quality of individual post-training. The latter is clearly unacceptable given the catastrophic consequences of inadequate and inappropriate leadership in the face of a demand for a zero-loss war. Thus, greater steps must be taken to ensure that selectors understand the requirement in the operational domain and match the selection and training to that requirement with empirical evidence.

In summary, we propose that selection and training must change to address new requirements in the operational domain. It has long been established, for nearly forty years, that good leaders as intelligent, articulate, and socially skilled with even the most basic of leadership textbooks identifying these factors for selection (Heller, 1999). More insight is required to identify those characteristics required for modern and future domains of operation because the present match between selection and outcomes is relatively weakly associated as indicated by moderate predictive validity in the tests applied.

## References

- Anderson, A.H., Newlands, A., Mullin, J., and Fleming, A.M.** (1996) Impact of video-mediated communication on simulated service encounters. *Interacting with Computers*, 8,2, 193-206.
- Archer, N.P.** (1990) A comparison of computer conferences with face-to-face meetings for small group business decisions. *Behaviour and Information Technology*, 9,4, 307-317.
- Bales, R.F.** (1950) *Interactional Process Analysis: A Method for Study of Small Groups*. Reading, MA. : Addison Wesley.
- Bales, R.F. and Slater, P.** (1955) Role differentiation in small decision-making groups. In T. Parsons and R.F. Bales (Eds) *Family, Socialisation and Interaction Processes*. New York : Free Press.
- Bass, B.M.** (1990) *Bass and Stogdill's Handbook of Leadership : Theory, Research and Managerial Applications* (3<sup>rd</sup> Ed.). New York : Free Press.
- Bateman (III), R.L.** (1999) Pandora's Box. In R.L. Bateman (1999) *Digital War : A View From the Front Lines*. Novato, U.S.A. : Presidio Press, pp. 1-52.
- Beatty, D.** (1995) *The Naked Pilot : The Human Factor in Aircraft Accidents*. Shrewsbury, U.K. : Airline Publishing Ltd.
- Belbin, R.M.** (1999) *Management Teams: Why they succeed or fail*. Oxford : Butterworth-Heinemann.
- Birch, P.** (1999) *Instant Leadership*. London : Kogan Page.
- Bjork, R.A.** (1994) Memory and Metamemory Considerations in the Training of Human Beings. In J. Metcalfe and A.P. Shimamura *Metacognition : Knowing about Knowing*. Massachusetts Institute of Technology, U.S.A. : MIT Press.
- Blackler, F.** (1995) Activity theory, CSCW and organisations. In A.F. Monk and N. Gilbert *Perspectives on HCI : Diverse Approaches*. London, U.K. : Academic Press.
- Blake, R.R., and Mouton, J.S.** (1968) *The Managerial Grid* : Gulf Publishing Company : Houston.
- Bowers, C.A., Oser, R.L., Salas, E., and Cannon-Bowers, J.A.** (1996) Team performance in automated systems. In R. Parasuraman and M. Mouloua (Eds.) *Automation and human performance : Theory and applications*. Hove, Sussex: Lawrence Erlbaum Associates.
- Brunas-Wagstaff, J.** (1998) *Personality : A Cognitive Approach*. London, U.K. : Routledge.
- Buckley, R., and Caple, J.** (1995) *The Theory and Practice of Training* 3<sup>rd</sup> Ed.. London : Kogan Page.
- Carlson, R.A.** (1997) *Experienced Cognition*. Mahwah, New Jersey : Lawrence Erlbaum Associates.
- Christensen, E.W., and Fjermestad, J.** (1997) Challenging group support systems research : The case for strategic decision making. *Group Decision and Negotiation*, 6,4, 351-372.
- Cook, M.J., Angus C., and Campbell C.** (1999) *Mediated Decision Making in Multi-Crew Systems. People in Control : Conference Publication No. 463*. London : Institute of Electrical Engineers.
- Cook, M.J., Elder, L., and Pascual, R.** (1999) Activating, Developing and Maintaining Effective Schema in Mental Models of Dynamic Time Critical Team-Oriented Behaviour. *People in Control : Conference Publication No. 463*. London : Institute of Electrical Engineers.
- Cook, M.J., Angus, C.S., Brearley, C., and Drummond, K.** (1998) *Decision Making Product or Process : The implications for training*. Presentation at the **23rd conference** 1998 was held at the Schloss Wilhelminen-Berg, Vienna on Sept. 14 - 18th, 1998.
- Cook, M.J., Angus, C., Brearley, C., and Stewart, C.** (1998) *Effective communication is not enough for effective teamwork*. Presentation at the **23rd conference** 1998 was held at the Schloss Wilhelminen-Berg, Vienna on Sept. 14 - 18th, 1998.

- Cook, M.J., and Elder, L.** (1998a) Training group performance for biasing and de-biasing decision making which avoids Groupthink. RTO-HFM Symposium on Collaborative Crew Performance in Complex Operational Systems, 19 (1-11), RTO-MP-4, AC/323 (HFM) TP/2, Neuilly-sur-Seine, France : NATO (RTO-HFM).
- Cook, M.J., Elder, L., and Ward, G.** (1997a) Decision making, planning, and teams. C5 (Human Computer Interaction) Digest No. 97/137. London : Institute of Electrical Engineers.
- Cook, M.J., Elder, L., and Ward, G.** (1998b) Communication Requirements in the Cockpit. RTO-HFM Symposium on Collaborative Crew Performance in Complex Operational Systems, 19 (1-11), RTO-MP-4, AC/323 (HFM) TP/2, Neuilly-sur-Seine, France : NATO (RTO-HFM).
- Cook, M.J., Elder, L., and Ward, G.** (1997b) Cooperative Technology in Air Defence and Ground Attack. C5 (Human Computer Interaction) Digest No. 97/137. London : Institute of Electrical Engineers.
- Cook, M.** (1998) Personnel Selection 3<sup>rd</sup> Edition. Chichester, U.K. : John Wiley.
- Clancey, W.J.** (1997) Situated Cognition : On Human Knowledge and Computer Representations. Cambridge : Cambridge University Press.
- Cleckley, M.** (1964) The Mask of Sanity 4<sup>th</sup> Ed. St. Louis : C.V. Mosby.
- Cushing, S.** (1994) Fatal Words. London : University of Chicago Press.
- Eiser, J.R.** (1986) Social Psychology : Attitudes, Cognition and Social Behaviour. Cambridge : Cambridge University Press.
- El-Shinnawy, M., and Vinze, A.S.** (1997) Technology, culture and persuasiveness: A study of choice-shifts in group settings. International Journal of Human Computer Studies, 47, 3, 473-496.
- Fielder, G.E.** (1964) A contingency model of leadership effectiveness. In L. Berkowitz (Ed.) Group Processes. New York : Academic Press.
- Fielder, G.E.** (1967) A Theory of Leadership Effectiveness. New York : McGraw-Hill.
- Fielder, G.E.** (1971) Leadership. Morriston, New Jersey : General Learning Press.
- Fielder, G.E.** (1981) Leadership Effectiveness. American Behavioural Scientist, 24, 619-632.
- Fielder, G.E. and Chemers, M.** (1984) Improving Leadership Effectiveness: The Leader Match Concept. New York : Wiley.
- Fleming, I.** (1996) The Teamworking Pocketbook. Alresford Hants. UK : Management Pocketbooks.
- Fleming, I.** (1996) The People Manager's Pocketbook 2<sup>nd</sup> Ed.. Alresford Hants. UK : Management Pocketbooks.
- Fleishman, E.A.** (1973) Twenty Years of Consideration and Structure, in E.A. Fleishman and J.F. Hunt (Eds.) Current Development in Study of Leadership. Carbondale, Illinois : South Illinois University Press.
- Fowler, A.** (1995) Negotiating, Persuading and Influencing. London : Institute of Personnel and Development.
- Goguen, J.A.** (1994) Requirements engineering as the reconciliation of social and technical issues. In M. Jirokta and J. Goguen (Eds.), Requirements Engineering : Social and Technical Issues. B.R. Gaines and A. Monk (Eds.), Computers and People Series. London : Academic Press.
- Graeber, R.C.** (1988) Aircrew Fatigue and Circadian Rhythmicity. In E.L. Weiner and D.C. Nagel Human Factors in Aviation. London : Academic Press.
- Greatbach, D., Heath, C., Luff, P. and Campion, P.** (1995) Conversation Analysis : Human-Computer Interaction and General Practice Consultation. In A.F. Monk and N. Gilbert Perspectives on HCI : Diverse Approaches. London, U.K. : Academic Press.
- Hardingham, A.** (1995) Working in Teams..London : Institute of Personnel and Development.
- Hardingham, A.** (1996) Designing Training. Training Essentials. London : Institute of Personnel and Development.
- Hayes, N.** (1997) Successful Team Management. Essential Business Psychology. Clive Fletcher (Series Ed.). London : Thomson Business Press.
- Hartley, P.** (1997) Group Communication. London : Routledge Publishers.
- Heller, R.** (1999) Effective Leadership. London : Dorling Kindersley.
- Hewson, R.** (1999) Operation Allied Force : The First 30 Days. World Air Power Journal, 16-29.
- Hollennagel E.** (1993) Human Reliability Analysis : Context and Control. B.R. Gaines and A. Monk (Eds.), Computers and People Series. London : Academic Press.
- Hollingshead, A.B.** (1996a) Information suppression and status persistence in group decision making: The effects of communication media. Human Communication Research, 23, 2, 193-219.
- Hollingshead, A.B.** (1996b) The rank-order effect in group decision making. Organisational Behaviour and Human Decision Processes, 68, 3, 181-193.
- Huey, B.M., and Wickens, C. D.** (1993) Workload Transition : Implications for Individual and Team Performance. Washington D.C. : National Academy Press.
- Isby, D.C.** (1997) Jane's Air War I: Fighter Combat in the Jet Age. London : Harper Collins.

- Jennings, D., and Wattam, S.** (1994) *Decision Making : An Integrated Approach*. London, U.K. : Pitman Publishing.
- Jones, M.** (1995) *Organisational Analysis and HCI*. In A.F. Monk and N. Gilbert *Perspectives on HCI : Diverse Approaches*. London, U.K. : Academic Press.
- Katzenbach, J.R., and Smith, D.K.** (1993) *The Wisdom of Teams: Creating the High Performance Organisation*. Boston, U.S.A. : Harvard Business School Press.
- Kirkpatrick, S.A., and Locke, E.A.** (1991) *Leadership – Do Traits Matter ?* *Academy of Management Executives*, May, 46-80.
- Klein, G.** (1997) *Developing expertise in decision making. Thinking and Reasoning*, 3, 4, 337-352.
- Larson, C.E., and LaFasto, F.M.** (1989) *Teamwork : What must go right / What can go wrong*. Sage Series on Interpersonal Communication 10. London : Sage.
- Leonhard, R.R.** (1999) *A Culture of Velocity*. In R.L. Bateman (1999) *Digital War : A View From the Front Lines*. Novato, U.S.A.: Presidio Press, pp. 131-151.
- Lim, L-H., and Benbasat, I.** (1997) The debiasing role of group support systems: An experimental investigation of the representativeness bias. *International Journal of Human-Computer Studies*, 47, 3, 453-471.
- Mantovani, G.** (1996) *New Communication Environments : From Everyday to Virtual*. London : Taylor Francis.
- Martin, A.** (1995) Possibilities, pitfalls and partners. In D. Coleman and R. Khanna (Eds.) *Groupware : Technology and Applications*. Upper Saddle River, New Jersey : Prentice Hall.
- McIlveen, R. and Gross, R.** (1999) *Aspects of Psychology : Social Influence*. London : Hodder and Stoughton.
- McAllister, B.** (1997) *Crew Resource Management : Awareness, Cockpit Efficiency and Safety*. Shrewsbury, U.K. : Airlife Publishing Ltd.
- McPherson, M.** (1998) *The Black Box : Cockpit Voice Recorder of In-Flight Accidents*. London : Harper-Collins.
- Mosier, K., and Skitka, L. J.** (1996) In R. Parasuraman and M. Mouloua (Eds.) *Automation and human performance : Theory and applications*. Hove, Sussex: Lawrence Erlbaum Associates.
- Mulder, P.** (1999) *Allied Force Planning NATO Attacks*. *Air Forces Monthly*, pp. 50-54.
- Pascual, R.** (1998) *Personal Communication*. DERA Ft. Halstead.
- Penney, S., Doke, D.D., and Warwick, G.** (1999) *Joint Pressure*. *Flight International*, 13<sup>th</sup>-19<sup>th</sup> October, 38-40.
- Randall, D., Hughes, J., and Shapiro, D.** (1994) Steps towards a partnership: Ethnography and system design. In M. Jirokta and J. Goguen (Eds.), *Requirements Engineering : Social and Technical Issues*. B.R. Gaines and A. Monk (Eds.), *Computers and People Series*. London : Academic Press.
- Rasmussen, J.** (1983) Skills, rules, and knowledge: Signals, signs, and symbols, and other distinctions in human performance models. *IEEE Transactions on Systems, Man and Cybernetics*, SMC-13, 257-266.
- Rasmussen, J.** (1986) *Information processing and human-machine interaction: An approach to cognitive engineering*. Amsterdam: North Holland.
- Reeve, J.M.** (1997) *Understanding Motivation and Emotion 2<sup>nd</sup> Ed.*. London : Harcourt Brace.
- Reid, F.J.M., Ball, L.J., Morley, A.M. and Evans, J.St.B.T.** (1997) Styles of group discussion in computer-mediated decision making. *British Journal of Social Psychology*, 1997, 36,3, 241-262.
- Rendall, I.** (1997) *Splash One : the Story of Jet Combat*. London : Weidenfeld and Nicolson.
- Sarter, N.B., and Woods, D.D.** (1994) Pilot interaction with cockpit automation II: An experimental study of pilots' model and awareness of the flight management system. *The International Journal of Aviation Psychology*, 4, 1, 1-28.
- Scrivener, S.A.R.** (1994) *Computer-Supported Cooperative Work*. Aldershot, Hants. : Avebury Technical.
- Spick, M.** (1995) *Designed for the Kill : The Jet Fighter – Development and Experience*. Shrewsbury : Airlife Publishing Ltd.
- Stodgill, R.M.** (1974) *Handbook of Leadership*. New York Free Press.
- Suster, G.** (1997) *Generals : The Best and Worst of Military Commanders*. London : Robson Books.
- Thompson, E.** (1995) *Colour Vision*. London : Routledge.
- Thornborough, A .** (1995) *Modern Fighter Aircraft : Technology and Tactics*. Yeovil, Somerset, U.K. : Patrick Stephens Limited.
- Valacich, J.S., and Schwenk, C.** (1995) Devil's advocate and dialectical inquiry effects on face-to-face and computer-mediated group decision making. *Organisational Behaviour and Human Decision Processes*, 63, 2, 158-173.
- Vandergriff, D.** (1999) *The Culture Wars*. In R.L. Bateman (1999) *Digital War : A View From the Front Lines*. Novato, U.S.A.: Presidio Press, pp. 197-254.
- Wren, K.** (1999) *Social Influences*. Routledge Modular Psychology Series. London : Routledge (Taylor and Francis Group).

# Data Integration and Classification for an Officer Selection System.

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## Summary

This paper focuses on the integration of different selection data in order to select and assign officer applicants. First the problem is defined. Three topics are discussed in more detail: the heterogeneousness of the selection data on hand and the problems this can cause, the integration of selection data in order to estimate the suitability of an individual for a specific officer training and the problem of the allocation of candidates to different vacancies. Next, possible approaches are discussed and finally, the paper comes to some conclusions. These advocate the use of modern multi-criteria and multidimensional classification methods to capitalize on the applicant population to optimize the officer corps quality.

## Introduction

In most if not any officer selection settings, one is confronted with the situation that a number of candidates apply for a number of vacancies. In many countries, the applicants are youngsters that are totally unknown by the military at the time they apply and usually they can apply for different kinds of officer vacancies depending on the different Services or on different training courses. That is the situation that we'll use as the context for this paper.

The methodology used in officer selection systems is often based on the collection of information from the individual applicants. Once the information is available for all the applicants, decisions are made concerning which applicants will be accepted and for what entry.

This approach has two major aspects. The first question that has to be solved is the one dealing with what information is needed about an applicant. The purpose of that information is to help us to estimate how appropriate it is to accept a particular applicant. It therefore makes sense to look for information that can help us predict the performance of a person if he or she would be accepted as officer cadet. This brings us in the domain of job-analysis. One of the basic rules in selection is to start with a good job-analysis enabling the definition of the job requirements. Once the job-requirements are known, it will be the joined task of

selection and training to guarantee that the selected and trained cadets meet them. Although we recognize that the officer corps encompasses a wide variety of jobs and that defining the required aptitudes, skills and personality characteristics is a challenging task, we're still convinced that no selection or training can be conceived without knowing these requirements. The importance of the job analysis for the outcome of quality of the officer corps is paramount (yet frequently overlooked or heavily based on tradition and obsolete scientific points of view), but is not the topic of this paper.

The second aspect in the methodology described above, is the problem of how you integrate and use the information that was gathered to produce the selection and allocation decisions. That is the issue this paper will deal with.

## Problem definition

Let us now start analyzing the problem. First, we'll recognize that the selection-data are very heterogeneous and this has tremendous bearing on the way we can integrate them. Secondly, we'll describe how data can be combined to quantify the appropriateness of enlisting an individual applicant for a particular vacancy and finally, we'll discuss the issue of selection and allocation at the group level: how can we capitalize on the applicant population to optimize the overall quality of the enlisted for the different vacancies?

## Heterogeneous information

Once the job-analysis issue is solved in one way or another, it appears that different kinds of information are considered relevant to help estimating the suitability of an applicant. There is nothing new about that: Wang (1993) for instance reports that multi-faceted models of personnel assessment were already used by the ancient Chinese 300 years BC. For officer-candidates, the relevant information often includes a medical profile, physical fitness scores, psychometric test results, assessment center ratings, academic examination scores, academic transcripts, biodata, interview scores, the applicant's preference towards the different entries, etc. These data vary significantly in different ways: their relevance towards the officer-job, the degree to which



poor results can be remedied through training, their measurement quality and related to that, the way you can process them mathematically. Let us expand a little bit on these topics.

#### *Relevance*

The first question to be addressed when selection data are discussed is their relevance. Selection data evaluate particular abilities, skills, attitudes etc, or put in a more generic term, person-attributes. Relevance deals with the importance of having that attribute or showing a certain amount of it to perform well, e.g. as an officer. General intelligence for instance will be considered relevant for officer selection because brighter officers tend to be better officers. It is important to emphasize that this relevance is quite independent of the measurability of the attributes. Biometric attributes such as height or weight are very easy to measure yet not very important (with some exceptions). Leadership on the contrary is very relevant for officers but quite difficult to measure. Less precision at the measurement side bears the risk of concealment of the real relationship between the attribute and performance appraisal on the job. Statistical methods will then usually underestimate the importance or weight that has to be given to this attribute. The conclusion that we can draw from this in the light of this paper's topic is that the assessment of the relevance of selection data is paramount for data-integration but that relevance of an attribute is not depending on the precision of its measurement.

#### *Level of remediation through training*

The answer to the question on how important it is for a candidate to demonstrate a certain level of an attribute during the selection process, is not only depending on how much the attribute bears on officer proficiency, but also on how well the attribute can be acquired or developed through training. From the knowledge that the level of physical fitness is easier to improve than general intelligence for instance, it makes sense to treat both attributes in a different way during the selection process. When a certain level of intelligence is required to become an officer, that level will have to be present at the time of selection because it is known that general intelligence is an attribute that doesn't improve through training. During the selection process an adequate measurement of the intelligence has to be performed and applicants with intelligence scores below the required level will have to be rejected. For attributes that can improve a lot by training, things are quite different. Physical fitness is a typical example. Usually, progressively more demanding standards have to be met during the officer training. Through providing adequate physical training to officer cadets and allowing sufficient time between the successive hurdles, the selection standards related to physical fitness shift from the assessment of the level required to be an officer to the assessment of the *potential* needed to reach the set

standards after proper training. In practice, this could imply that a selection system would rather use a measure of oxygen absorption capacity than a Cooper test since the first measures potential and the second tests achievement. In conclusion, the weight that is given to a particular selection data or the minimum that is required during selection is partly depending on the trainability of the considered attribute.

#### *Measurement quality*

In contrast to some selection settings in civilian life, the officer selection always deals with relatively large numbers of applicants and selection-data. As a consequence, it becomes prohibitive to try to solve the selection and allocation problem in an artisan's way by persons who would know all data on the jobs and the applicants. To solve the equation it will prove to be necessary to code or quantify all selection-data. Quantification is achieved through measurement. Yet, the measurement of the different relevant person-attributes cannot be realized in a unique way. Most books on statistics explain the different measurement scales and the mathematical treatments that are or aren't allowed to perform (Stevens, 1995). For the purpose of data-integration in selection, it is essential to make at least the distinction between metric versus categorical data. Metric data can include test scores, physical fitness scores, biometric data and so on whereas categorical data may encompass previous studies, biodata or medical data. Metric and categorical data are equally important in estimating the suitability of officer applicants. The integration of both kinds of data in a sensible way however is not an easy task.

A last point to make about the heterogeneousness of the selection data concerns the job-preference expressed by the applicant. There is an essential difference between the traditional selection-data and the expressed job-preference in that selection-data are independent of the considered entry. An applicant's verbal ability for instance does not vary whether the candidate applies for the Air Force or the Army. The job-preference does. This means that the job-preference data need to be treated in a particular way. We'll come back to this later.

#### *Individual's assessment*

At the individual level, it will be necessary to express the appropriateness of accepting a particular person for a specific entry. When this expression is quantified, we'll call it the *payoff* for individual  $x$  and entry  $y$ . To establish a payoff, we will have to integrate the available information for each applicant.

But before going into more details, let's open a parenthesis on 'early rejection'. Early rejection occurs when an applicant is screened out before the end of the full selection process. This happens when he or she doesn't meet certain requirements. For instance, one can be rejected for being older than the maximum age

allowed by law or because he's considered medically unfit. Screening applicants out is an attractive tool for selection centers because this diminishes the workload. But we should be very cautious when doing so for two major reasons. The one deals with the error of measurement of our selection tools (Lescrève, 1997) and the other with the power of classification methodology that can guarantee that applicants with low scores on specific attributes will not be assigned to entries for which these attributes are important.

Let's now take a closer look at the decision-making for those applicants who complete the full selection-process. Two data-integration systems are widely used: One includes some kind of selection board that reviews the applicant's data and decides on a final score, the other approach does so in a more mathematical way, without human intervention at the individual level.

Officer selection systems often rely on humans for making the final decisions concerning the suitability of an applicant to become an officer (whether or not specified for a particular entry). In many countries, there are selection boards consisting of experienced (senior) officers, eventually assisted by psychologists or other human resource management or training specialists who have at their disposal all available information concerning an applicant. Their task is to integrate that information into a final score or judgment of the applicant. Having extensive experience of military life as an officer is often required to serve in such a board. The idea beyond this is that the board member has to evaluate if the applicant will fit in the officer corps and therefore needs to rely on a personal knowledge acquired through experience. There are a number of things to say to that.

First, we have to admit that the assessors' experience is personal indeed and not necessarily representative for the jobs the applicants are likely to enter. This becomes even more salient in countries having or moving to tri-service selection boards (Belgium, The Netherlands...) where Army officers have e.g. to select officers for the Navy or the Air Force. But even within a Service, the organizational culture of the different branches can be quite different. Often, 20 to 30 years have elapsed since board members joined up. So, their experience of junior officer training is quite old, not to say probably obsolete. If their personal life is mainly confined to contacts with fellow officers they can lose track of the current culture among civilian youngsters. These things bear the risk that the board members rely on irrational beliefs or actual but not representative cases and emphasize the wrong aspects during the assessment of applicants.

A second comment about the members of selection boards concerns their training as assessors. Although efforts are undoubtedly made to train the board members, training is often short and focuses on the specific skills required for the job but not including a

more thorough theoretical background that is provided through behavioral sciences education. This opens the risk of having the board members' assessment influenced by affiliation tendencies, transfer, pre-scientific beliefs and so on in an unnoticed way.

The third remark concerning the way selection boards work, has to do with the desirability of assessing the person-organization fit. Keenan (1997) puts it in this way: "The method for developing criteria ... is based on the premise that selectors are primarily attempting to match abilities to job performance requirements. However, in practice, many selectors may be looking for person-organization fit as much as person-job fit, i.e. does the person share the values and 'modal personality' of the organization? While few would seriously question the logic of seeking to maximize person-job fit, the wisdom of focusing excessively on person-organization fit is much more questionable in many circumstances. For example, person-organization fit could actually be counter-productive if innovation is a key organizational requirement." Innovation and flexibility are certainly key elements for modern armies, yet it is surprising to see how often tradition and obsolete scientific principles bear on the officer selection practice.

For the sake of fairness and to help the boards to reach decisions in an economic way - meaning avoiding time-consuming arguments when discussing modal applicants- the boards tend to develop more or less formal decision rules based on the selection data. These rules are derived from practice and are usually unsophisticated.

When confronted with the proposition to use these rules automatically, say by a computer, without further intervention of the board, many selection boards would object vigorously. Their members probably will argue that their job is highly sophisticated and requires a lot of military experience, that each individual must be assessed in a particular way, and so on. They probably will tell you in the end that you can't have a computer make a decision about future officers, without recognizing that computers only apply rules that were given by decision makers in the first place.

The reliability and fairness of selection boards depend on the consistency with which they derive final conclusions from the selection data. This consistency can be altered by the changing composition of the boards over time or geographically and the evolution of actual data processing over time, for instance between the first and last applicants for an annual recruitment. In any case, the reliability of selection boards is quite low compared to the reliability achieved by an algorithm on a computer that equals about one.

Another criticism concerns the way decision rules are elaborated. As mentioned earlier, selection boards often try to develop rules in seeking objectivity and efficiency. In normal circumstances, the quality of those rules



depends on the empirical data and the methodology used to develop them. By consequence, the development of such data-integration rules is a specialist's work requiring proper behavioral sciences background. Selection boards not relying on behavioral scientists to develop decision rules are at risk of using totally inadequate rules that have negative impact on the quality of selected officer cadets.

What is the alternative to these selection boards? In theory, the answer is quite simple. Once selection-data are available for an officer-candidate, these data have to be integrated into a payoff value in an objective way. Since it is necessary to quantify all selection data, the objectivity can be achieved by means of having the payoff calculated by computer software. The next question of course is what rules the computer has to apply. That will be discussed in the section on possible solutions further in this paper. For the moment, we only want to state that existing data-integration rules applied in practice are often too unsophisticated to take all relevant selection-data into account and lack specificity for the different entries as officer-cadets.

### **Classification**

Classification is important in settings where all selected officer applicants do not start the same training. This happens in tri-service selection systems where candidates can apply for different Services simultaneously and where an allocation decision has to be made as to what Service they will enter. Classification is also needed in the many settings where the selection is organized for one Service only but where different training courses are available. If there are different entries, it will be necessary to estimate the suitability of an applicant for each one of these entries. As long as there is only one entry, the allocation problem is simple. We can make a single ranking of the applicants based on their payoff values and admit the 'best' ones. The problem is tougher with more entries. Some officer selection systems then try to solve the problem by making a single ranking of all applicants and then assign them sequentially according to their preferences if they meet the minimal standards for the entry of their preference. Modern selection and classification evaluation methodology can demonstrate that these sequential allocation algorithms yield quite poor solutions in terms of entry related quality of the enlisted officer-cadets (Darby et al., 1996).

### **Possible solutions**

In this section we will discuss some approaches to solve the problems identified so far. Afterwards, we'll try to illustrate our points with an example originating from the selection and classification method developed by the Belgian Armed Forces and called *The Psychometric Model*.

#### *Data-integration at the level of the individual officer-applicant*

Recognizing that different entries as officer-cadet require different (levels of) attributes, the problem of quantifying the appropriateness of enlisting a candidate has first to be considered at the level of a particular entry. How can we then, based on the metric and categorical selection data and the applicant's job-preference, compute a payoff for a particular entry, that would reflect the desirability to enlist a particular applicant compared to the others? Let's review and comment some techniques.

The *Subject Matter Experts* method consist of identifying a number of persons who can be considered experts in the field of officer training and officer performance appraisal after the training period. These experts decide what information and measures need to be obtained from the officer-candidates during the selection process and how these should be combined to yield a payoff for the entry they are experts in. This method has advantages in the sense that it can be used for new training courses and that it can give an important weight to abilities that are believed to be important but not essential in the early stage of training and officer job. That won't be possible with the next two methods we'll discuss because these rely on the statistical relation between selection and performance after enlistment. The tremendous drawback of this subject matters experts' method lays in its subjectivity. Changing the 'experts' usually will change the requested combination of selection data and this is not likely to be acceptable.

The next two methods are aimed at the computing of payoff values that correlate highly with some chosen criterion that is believed to summarize the assessment of how well an officer (cadet) functions in the Forces. In practice, these payoff values are statistical estimates of the criterion score.

*Multiple Linear Regression models* are designed to estimate a dependent variable, based upon a series of independent variables. These models are particularly well suited for the prediction of performance criteria based upon selection data and are in fact quite widely used. These models however cannot yield a perfect solution to our problem. First there is the problem of the integration of categorical data. Linear models use primarily metric data and although they can incorporate categorical data or even be based upon categorical data only -in which case they're called *analysis of variance models*- they tend to become fairly complex as soon as the number of categorical variables and the number of classes per variable increases. It is possible to convert each class of a categorical variable into a Boolean 'indicator' variable with value one if the person belongs to the class and zero else. Each indicator variable has then to be integrated in the model equation. Practice

shows that huge amounts of data are needed in order to get significant beta-weights for these indicator variables. Another current method allocates a value to each class of the categorical variables that consequently will be treated as if it were metric. The basic difficulty with allocated values is that they define a metric for the classes of the qualitative variable which may not be reasonable (Neter, 1990).

A second problem arises as soon as a performance criterion needs to be chosen to build the linear model. That choice will affect the composition of the officer corps to a large extent. Say for instance that you take the final grades of the first year of the Military Academy as criterion. If the main topic of that academy is rather academic than military, it can be expected that selection variables such as general intelligence or mathematics knowledge will have a large weight in the regression equation compared to e.g. leadership and physical fitness. This means that if you use that linear model to generate the payoff values for your officer selection, you will end up with a hired group that probably will succeed well in the academic training but could perform quite poorly in leadership and physical fitness once they become platoon commanders.

*Artificial Neural Networks* offer an alternative to the linear models to predict a chosen criterion such as training results or job performance assessments. These models are more powerful to integrate metric and categorical data but require a strong mathematical background and expertise that isn't widespread up to date. They also need huge amounts of data to be developed properly and their usefulness is also conditioned by the choice of a relevant criterion.

The Belgian Psychometric Model uses a combination of the first two methods. Metric data are processed as a weighted sum to generate a provisional payoff. Subject matter experts determine the weights based upon multiple regression equations, where available. The provisional payoffs are consequently altered in a multiplicative way by coefficients given by the experts to each class of the categorical data. In a last step, the modified payoff is altered again to reflect the applicant's preference towards the considered entry. The generic formula used for computing the payoff of an applicant for a specific entry is given below. More details about this formula are provided by Lescrève (1997, 2)

$$Y_{ij} = \left( \sum_{m=1}^u \beta_{mj} \cdot X_{im} \right) \left( \prod_{c=1}^v \gamma_{cij} \right) \left( \prod_{p=1}^w [(X_{ijp}/X_{Maxjp}) \cdot \phi_{pj}] + (1 - \phi_{pj}) \right)$$

$Y_{ij}$  is the payoff-value of person  $i$  for job  $j$ ;  
 $m$  (1 to  $u$ ) represent the metric variables;  
 $\beta_{mj}$  is the weight given to variable  $m$  for job  $j$ ;  
 $X_{im}$  is the score of person  $i$  on variable  $m$ ;  
 $c$  (1 to  $p$ ) represent the categorical variables;

$\gamma_{cij}$  is the coefficient given for job  $j$  to the category of variable  $c$  to which person  $i$  belongs;

$p$  (1 to  $w$ ) represent the variables concerning the preferences;

$X_{ijp}$  is the expressed preference of person  $i$  for job  $j$  on variable  $p$ ;

$X_{Maxjp}$  is the scale maximum of  $X_{ijp}$ . The reason why this is required, is to obtain a maximum value of 1 for the expression  $X_{ijp}/X_{Maxjp}$ ;

$\phi_{pj}$  is the weight given to preference variable  $p$  for job  $j$ ;

### *The classification issue*

Once a payoff is computed for each applicant-entry combination, a final answer to the question of who will be accepted for each vacancy, still has to be given. The number of possible solutions is huge. If one considers a particular vacancy, it is quite obvious that the 'best' applicant is the one with the highest payoff for that vacancy. On the other hand, when you look at a particular officer-applicant and you wonder for which vacancy the Military would prefer to enlist him or her, you should look for which vacancy he or she has the best results, compared to the other applicants. Provided that the payoff-values have been standardized per vacancy, the vacancy looked for is the one for which the applicant has his or her maximal payoff. This can be done for each vacancy or each applicant but it's trivial that this will not yield the expected solution to our classification problem. Outstanding applicants can indeed be the best for different vacancies for instance. The best possible solution is the one that maximizes the payoff-values of the applicants who are accepted for the vacancies. Finding the solution then becomes an operational research problem. Fortunately, some algorithms derived from the so-called *Hungarian method* or the *Traveling salesman problem* do the job very well. Such approaches are found in the CLASP method (Kroeker & Rafacz, 1983) or the Belgian Psychometric Model (Lescrève, 1993, 1995, 1996). Such models are by far more powerful than sequential allocation methods. As quoted by Hardinge: "By reworking ASVAB data sets, Alley and Teachout (1992) showed that using a differential placement model could result in performance gains of one-third of a standard deviation above current assignment procedures."

### *Quality assessment of the different solutions*

Previous sections have clearly illustrated the complexity of the data-integration issue for officer selection. It is quite obvious that there is no unique solution to the problem. To reach a sound solution, it is necessary to acquire a good understanding of the different aspects of the matter, their interactions and the methods that can help us solve the question. But that is not enough. An essential task in the development and maintenance of a good selection and classification system is the

assessment of its quality. This needs to be approached in two ways. The first focuses on the distribution of the attributes in the different entries. For instance, we will compute the average and standard deviation of the enlisted applicants' general intelligence scores in each entry and compare that to the general intelligence level of the applicant population and check whether the results match the different entry requirements (Lescrève, 1998). The second and more important method will look at criterion related quality indicators such as pass-fail rate in the different entries, predictive validity of the payoffs or long-term prediction of officer proficiency.

## Conclusion

In this paper, we tried to demonstrate that the quality of the officer selection process, applied to a given group of applicants and a number of different vacancies, does not only depend on the choice and the quality of the selection data, but also to a large extent on the way the available information is processed, first at the individual level and secondly to solve the allocation issue.

Concerning the individual's level, we illustrated some of the methodologically less sound aspects of widespread current practice in officer-selection and tried to explain why these should be avoided. At the group-level, we advocated to get rid of overall rankings in favor of computing separate payoffs for each entry. We also emphasized the need to move from obsolete sequential allocation algorithms for they're bound to perform poorly and to replace them by better multi-dimensional classification methods.

We tried to indicate ways to solve the enumerated problems and illustrated the feasibility of what we discussed by referring to the Belgian Armed Forces Psychometric Model as an example of a generic multi-criteria multi-dimensional selection and classification tool.

Selection was born from the fact that persons differ in many ways. Neither officers nor officer jobs are all the same and it is foolish to believe that or act as if all officers are equal, all-round and interchangeable. As psychologists or military officers involved in officer selection, we should respect the specificity of each applicant, evaluate his or her competency-profile and use it to match it with the profiles required for the different officer jobs. Or, to end with a quote of Hardinge (1997) who peeks in the future of the selection of military staff stating: "Hopefully as attitudes and policies mature, the focus will be more on accepting differences and managing diversity. We will have stopped trying to find better measures of ability and will be looking for a better match between the individual's unique combination of physical, cognitive and affective functions and the organization's training and job requirements. Allocation models will be a major concern."

## References

- Alley, W. E., *Recent advances in classification theory and practice*. In M. G. Rumsey, C. B. Walker & J. Harris (Eds.), Personnel selection and classification. Hillsdale, New Jersey, Lawrence Erlbaum Associates, Publishers. 1994.
- Burke, E., Kokorian, A., Lescrève, F., Martin, C., Van Raay, P. & Weber, W., *Computer based assessment: a NATO survey*, International Journal of Selection and Assessment, 1995
- Darby, M., Grobman, J., Skinner, J. & Looper, L., *The Generic Assignment Test and Evaluation Simulator*. Human Resources Directorate, Manpower and Personnel Research Division, Brooks AFB, 1996.
- Hardinge, N. M., *Selection of Military Staff*. In International Handbook of Selection and Assessment, Edited by Neil Anderson and Peter Herriot, Wiley, 1997. p 177-178.
- Keenan, T., (1997) Selection for Potential: The Case of Graduate Recruitment. in International Handbook of Selection and Assessment, Edited by Neil Anderson and Peter Herriot, Wiley, 1997. p. 510.
- Kroeker, L. & Rafacz, B., *Classification and assignment within pride (CLASP): a recruit assignment model*, US Navy Personnel Research and Development Center, San Diego, CA, 1983.
- Lawton, D., *A review of the British Army Potential Officer Selection System* In Proceedings of the 36th Annual Conference of the International Military Testing Association, 1994.
- Lescrève, F., *A Psychometric Model for Selection and Assignment of Belgian NCO's* in Proceedings of the 35th annual conference of the Military Testing Association. US Coast Guard, . 1993 p. 527-533.
- Lescrève, F., *The Selection of Belgian NCO's: The Psychometric model goes operational*. in Proceedings of the 37th annual conference of the International Military Testing Association. Canadian Forces Personnel Applied Research Unit. 1995, p. 497-502.
- Lescrève, F., *The use of neural networks as an alternative to multiple regressions and subject matter experts in the prediction of training outcomes*, Paper presented at the International Applied Military Psychology Symposium, Lisboa, 1995.
- Lescrève, F., *The Psychometric model for the selection of N.C.O.: a statistical review*. International Study Program in Statistics, Catholic university of LEUVEN, 1996

- Lescrève, F., The determination of a cut-off score for the intellectual potential. Center for Recruitment and Selection: Technical Report 1997-3.
- Lescrève, F., Data modeling and processing for batch classification systems. in Proceedings of the 39th Annual Conference of the International Military Testing Association, Sidney, 1997
- Lescrève F., Immediate assessment of batch classification quality. In Proceedings of the 37th annual conference of the International Military Testing Association., 1998, Internet: [www.internationalmta.org](http://www.internationalmta.org)
- Neter, J., Wasserman, W. & Kutner, M. H., Applied Linear Statistical Models, Richard D. Irwin, Inc., 3<sup>rd</sup> Ed, 1990. p. 376.
- Stevens S.S., Mathematics, measurement and psychophysics. In S.S. Stevens (Ed.) Handbook of experimental psychology. New York: Wiley, . (1951). p. 1-49
- Wang Z.M., (1993) Culture, economic reform and the role of industrial/organizational psychology in China. In M.D. Dunette and L.M. Houghs (eds), Handbook of Industrial and organizational Psychology, 2nd edition, pp. 689-726. Palo Alto, CA: Consulting Psychologists Press.

## RECRUTEMENT ET SELECTION DANS L'ARMEE FRANCAISE *RECRUITING AND SELECTION IN THE FRENCH ARMY*

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L'évolution du contexte international a entraîné une réorganisation des structures de notre armée et un resserrement des forces conjointement à la fin (suspension) de la conscription. Dans cette période d'intense mutation, la sélection, le recrutement et la formation des officiers et des sous-officiers doivent absolument en tenir compte. Ce que nous appelons « REFONDATION » dans l'armée de terre induit dans le domaine des ressources humaines une exigence toujours accrue de performance qui s'appuie sur une gestion dynamique de carrières différenciées selon les compétences et selon l'origine et l'âge du recrutement ; il importe donc aujourd'hui d'adapter notre système de sélection, d'orientation et de recrutement pour répondre à ces nouveaux impératifs.

Dans ce cadre, l'armée de terre en particulier vise deux objectifs principaux dans l'ordre de priorité suivant, en définissant un nouvel équilibre entre l'exigence de qualité et la recherche du maintien de la cohésion du corps des officiers.

un premier objectif stratégique : garantir dans l'avenir la qualité des officiers, d'où un système de sélection adapté et performant.

un second objectif : maintenir la cohésion, d'où une liaison étroite entre la sélection, le recrutement et la gestion des personnels.

*The international context evolution has involved in a reorganization of our army structures, a tightening of the forces jointly the end (adjournment) of the conscription. In this period of intense transformation, selection, recruiting and training of officers and non-commissioned officers (NCO) must take into consideration. What we call « refoundation » in the Army infers in the field of human resources an ever-increased claim of performance which is relied on a dynamic management of carriers according to abilities and with the age and recruiting origin. So it matters today to adapt our selection orientation and recruiting system to respond on these new requirements.*

*Within this framework, the Army first at all aims two main goals defining a new balance between quality demanding and the research of the maintenance of officer's Corp cohesiveness.*

*A strategic aim guaranteeing in future the officers quality, hence a fit and efficient selection system.*

*A second aim: maintaining cohesiveness, hence a close link between the selection, the recruiting and the personnel staff managing.*

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Il s'agit d'attirer et de recruter la quantité et la qualité nécessaire à une armée professionnelle appelée à évoluer dans un contexte de plus en plus exigeant. La réalisation de cet objectif passe par un recrutement direct externe significatif, adapté aux missions actuelles, adaptable dans

l'avenir. En complément la diversité des missions impose aussi une diversité des origines. A ce titre, une plus grande diversité des types de recrutement direct est envisagée dans l'avenir.

***un second objectif : maintenir la cohésion, d'où une liaison étroite entre la sélection, le recrutement et la gestion des personnels.***

Les possibilités de promotion interne, facteur déterminant de la cohésion d'ensemble d'une armée, doivent absolument rester ouvertes pour toutes les catégories de cadres en différenciant les perspectives de carrière selon les compétences. La réalisation de cet objectif passe par le recrutement annuel de près de 2000 officiers toutes armées et gendarmerie confondues, la moitié par recrutement direct et l'autre moitié par promotion interne. Cet équilibre est susceptible de modifications en fonction des priorités et des besoins prospectifs.

### **I - VOIES D'ACCES AU RECRUTEMENT :**

Pour ce faire, l'institution militaire compte de nombreuses voies d'accès au recrutement de ses officiers qui peuvent être regroupées en quatre grands types ayant chacun leur propre système de sélection et leurs propres critères d'évaluation :

- recrutement interne sur dossier,
- recrutement interne sur concours,
- recrutement externe sur titres,
- recrutement direct par les grandes écoles militaires et civiles.

La carrière de la plupart des officiers de recrutement interne sera limitée aux grades d'officiers subalternes ou aux premiers grades d'officiers supérieurs. Celle des officiers de recrutement externe sur titre sera contractuelle et courte (inférieure à 20 ans). Enfin, les officiers de recrutement direct sont pratiquement assurés d'accéder au cours d'une carrière plus longue aux postes de responsabilité.

En réalité, le déterminisme apparent des carrières n'est pas aussi net et les officiers de valeur, quel que soit leur cursus scolaire de départ, ont leurs chances de réaliser une « belle carrière ».

Ces différents modes de recrutement sont issus de notre culture militaire et de nos traditions. C'est pourquoi la grande école avec son cycle de deux années de préparation intense sanctionnées par un concours, archétype du système scolaire français, semble toujours le mode d'accès le plus prestigieux et le plus attractif, dès lors qu'il s'agit de recruter directement et en grand nombre des officiers à vocation généraliste.

La qualité et la quantité des candidats aux grandes écoles militaires dépendent de la valeur reconnue des concours et de la compétition qu'ils suscitent. La sélection s'effectue alors par ordre de mérite dans des concours où l'essentiel des points est attribué au vu de l'**excellence intellectuelle** écrite et orale complétée par une note sportive pour environ 10%.

Une sélection médicale minimale (SIGYCOP) est également réalisée par le Service de Santé des Armées (SSA) pour s'assurer de l'état général des candidats, puis de celui des lauréats lors de leur incorporation en écoles. Pourtant peu de candidats sont éliminés à ce stade. En effet, ceux-ci ont tous pris soin d'effectuer des visites d'aptitude préliminaires.

L'aspect motivation n'est pas actuellement évalué de façon aussi délibérée que dans l'armée britannique où les épreuves de sélection tendent à mesurer en priorité l'aptitude au commandement, le leadership et l'esprit de corps, puis en deuxième position les capacités sportives et en dernier lieu le niveau scolaire (sauf s'il s'agit d'un scientifique).

Jusqu'à présent dans notre pays, la préparation du seul concours était considérée comme un indice suffisant de motivation (longueur de la période des classes préparatoires, difficulté du concours). Aujourd'hui les armées sont à la recherche d'un système d'évaluation des potentiels plus pertinent.

Les deux systèmes s'opposent également dans d'autres domaines comme celui de l'école unique (SANDHURST par exemple avec des promotions de cadets très hétérogènes en matière d'âge, de niveau scolaire et de durée de scolarité) par rapport à L'ECOLE SPECIALE MILITAIRE DE SAINT-CYR, qui forme les officiers de recrutement direct de l'armée de terre et de la gendarmerie. Les élèves y sont plus proches les uns des autres dans tous ces domaines, même si les voies d'accès sont variés : (concours « Sciences », concours « Sciences économiques et sociales », concours « Lettres », concours « Diplômés de l'Enseignement Supérieur »). La Marine et l'Armée de l'air se contentent du seul concours voie scientifique. Il convient de noter que le label grande école voie scientifique donne le titre recherché d'ingénieur.

Chaque armée en France dispose donc de sa « grande école » d'où provient en très grande partie ce qu'il est convenu d'appeler « l'élite militaire » issue d'une certaine excellence de la population étudiante.

Néanmoins le niveau du concours et le taux de sélection (1/9 à 1/6) ne peuvent plus suffire seuls à traduire le degré de satisfaction des armées pour ce type de recrutement et une réflexion est donc en cours. L'objectif est de mettre en place des tests de personnalité suffisamment discriminants et explicites pour écarter au recrutement les candidats qui ne présentent pas de façon manifeste, les aptitudes requises notamment comportementales, pour le métier des armes.

L'évaluation et la sélection des candidats officiers dans l'avenir vont donc devoir évoluer et se rapprocheront alors probablement des deux types suivants :

- **premièrement le recrutement interne** parmi les meilleurs sous-officiers par concours (sur l'évaluation de leurs connaissances générales et militaires) ou au choix (sur dossier en fonction de leur notation). Dans les deux cas, les candidats ont un dossier militaire, plusieurs notations annuelles personnalisées. Ils sont donc connus de l'institution militaire et peuvent aisément être comparés entre eux.

- **deuxièmement le recrutement externe** au choix ou bien par concours, complété par une évaluation de potentiel à base de tests en cours d'expérimentation et d'étalonnage.

## **II - PROJET DE SELECTION DES CANDIDATS OFFICIERS DE RECRUTEMENT EXTERNE :**

Parmi les candidats officiers de recrutement externe, seule la sélection des candidats aux carrières d'officier contractuel qui incombe directement à ma sous-direction d'appartenance sera détaillée.

### **21-Sélection des candidats au recrutement externe d'officier de carrière par la voies du concours :**

En plus du passage par le système des classes préparatoires et de la réussite à un concours d'une grande école, garantie d'une certaine forme d'excellence scolaire (déjà explicité dans la première partie), des tests de personnalité destinés à écarter les lauréats n'ayant manifestement pas les qualités de stabilité, de sérieux, d'endurance et

d'allant que l'on attend d'un officier, sont en cours d'étude par les armées.

Ce projet s'intègre dans des études plus globales concernant des dispositifs d'évaluation, de sélection et d'orientation de la carrière des officiers français, études qui n'en sont qu'à leurs débuts.

### **22-Sélection des candidats aux carrières d'officier contractuel par la voie externe au choix ou sur dossier ; officier à vocation encadrement ou de spécialiste (OSC).**

Cette sélection se déroulera en plusieurs étapes comprenant trois entretiens, une évaluation et enfin une commission décisionnelle au niveau national ..

- Le premier entretien est destiné à l'information mutuelle du candidat et de l'institution pour constituer le dossier. Il est réalisé par un officier recruteur en région.

- Le deuxième entretien dit d'évaluation est réalisé dans un Centre de Sélection et d'Orientation (il y a 5 CSO en France), après le passage d'une batterie de tests et d'une épreuve d'aptitude physique.

Cette évaluation est fondée sur le modèle théorique du P.O.Fit - person organisation fit -(Krystoff) qui vise à mesurer l'adéquation entre les besoins de l'organisation Armée de terre et les caractéristiques de la personne, en l'occurrence le candidat O.S.C.

Les besoins de l'armée de terre sont en cours de détermination par une étude de poste axée sur l'observation et l'évaluation psychométrique

La méthode utilisée est la méthode des experts pour définir le profil recherché :

- au niveau de la personnalité (Big Five avec le D5D)

- pour les aptitudes cognitives le questionnaire de FLEISHMAN.

Notre échantillon atteint plus de 200 personnes et continue de s'enrichir au fur et à mesure de nos enquêtes en écoles de formation d'officiers et dans les unités.

Deux types de postes ont été étudiés :

- l'OSC encadrement, destiné à tenir des fonctions de commandement du niveau section,

- l'OSC spécialiste, destiné à tenir des fonctions d'expert dans son domaine de compétence (niveau BAC +5 )



Les caractéristiques du candidat sont évaluées en CSO.

Ces éléments sont mesurés en terme de :

*Personnalité /aptitudes cognitives/gestion du stress* par une batterie d'évaluation du potentiel composée actuellement des tests D5D -description en 5 dimensions - du G.A.T -général aptitude test - et du C.I.S.S coping inventory for stressful situations

*Aptitudes psychomotrices* par le test ESPACE qui existe depuis 1995,

*Aptitudes physiques* par des épreuves physiques composées du test LUC-LEGER + un parcours d'obstacles + des tractions,

*La motivation* par l'observation du candidat au cours des épreuves et des tests ainsi qu'au cours des entretiens.

Muni de ces différents résultats, l'officier évaluateur en fait la synthèse. et détermine **l'adéquation personne - organisation**. Il émet un avis tenant compte de l'écart entre le profil recherché correspondant aux besoins de l'armée et les résultats obtenus par le candidat officier.

Cet avis se matérialisera par une appréciation manuscrite et par un code :

- A- correspond parfaitement au profil recherché,
- B- correspond probablement au profil recherché ,
- C- ne correspond pas au profil recherché ;

Le risque de ce système serait d'être trop « mécaniste » et d'engendrer en quelque sorte des « clones ». Pour éviter cet écueil, les officiers menant les entretiens aux différents niveaux ont l'obligation de tenir également compte de leur expérience du métier de soldat. Les avis de plusieurs officiers orienteurs sont d'ailleurs confrontés au moment du choix.

- le troisième entretien est réalisé par des officiers supérieurs de hauts niveaux :

pour les OSC encadrement par un colonel, ancien chef de corps, qui s'attachera à déterminer l'aptitude au commandement du candidat

pour les OSC spécialiste par un officier supérieur expert du domaine de compétence.

Enfin une commission nationale au vue des résultats précédents et des différents avis se prononcera sur le choix définitif des candidats en fonction des postes à pourvoir.



## RECRUITING AND SELECTION IN THE FRENCH ARMY

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Within this framework, the Army first at all aims two main goals defining a new balance between quality demands and the maintenance of cohesiveness officers' corps.

***A strategic aim guaranteeing in future the officers quality, hence a fit and efficient selection system.***

The concerns are to attract and to recruit the quantity and the quality necessary to a professional army, which is destined for moving in a context more and more restricting. The realisation of this aim is through by significant external direct recruitment, adapted the current missions, adaptable in the future. Moreover, the diversity of the missions also imposes a diversity of the origin of the formations (educational background).

By this way, a bigger diversity of the direct recruitment types is envisaged in the near future.

***A second aim: maintaining cohesiveness, hence a close link between the selection, the recruiting and the personnel management.***

The internal promotion possibilities, determining factors of the whole army cohesion must absolutely be kept open for all the categories of officers in differentiating career views according to the competencies. The realisation of this aim is through the recruitment of 2000 officers per year, which concerns the all the armies and the « Gendarmerie », half by direct recruitment, half by intern promotion. This balance may be modified

in accordance with the priorities and the prospective needs.

### **I - WAYS OF RECRUITMENT**

In this perspective, the military institution provides numerous ways of access for recruiting officers, which can be regrouped in four big types. These last have their own selection system and own evaluation criteria:

- Internal recruitment on file,
- Internal recruitment on competition,
- External recruitment on qualify files
- Direct recruitment by the militaries and the civil « grandes écoles » (Colleges of university level specialising in professional training).

The career of most of the internal recruited officers will be limited to the subaltern (or junior) officer's ranks or till the first superior officer's ranks. This Extern recruitment on qualify files will be contractual and short term (less 20 years long). After all, the direct recruitment officers are practically sure to access to responsibilities headquarters posts during a longer career.

In the reality, the apparent determinism of the careers isn't so clear and the values of officers whatever their original academic curses (background), have their chances to realise a « nice career »

These different ways of recruitment are issued of our military culture and of our traditions. This is why the « Grande Ecole » with its two years long intense preparation which is approved by a competition, archetype of the French academic system seems to be always the more attractive and prestigious access way, ever since it matters recruiting directly in high number of the generalist officers.

The quality and the quantity of the military « grandes écoles » applicants depend on the recognised value of the competition and the rivalry aroused. Then, the selection is accomplished in order of merit in competitions where the majority points is given according to the oral and writing intellectual excellence and completed by a sportive mark for nearly 10%.

A minimal medical selection (SIGYCOP : Superior and Inferior member, General condition, Eyes,

Chromatism, Ear, Psychology) is also realised by the army health services to make sure of the candidate general condition, then of this laureate during for their school draft. Nevertheless, few applicants are eliminated at this steep. Indeed, all these last have taken precautions to make preliminary aptitude examinations.

The motivation aspect isn't currently evaluated so intentional matter than in the British army where selection tests tend to measure in priority command aptitude, leadership, « esprit de corps », then in second position sporting fitness and in last academic level (except scientific). Till now in our country, the preparation of this exclusive competition was considered as a sufficient mark of motivation (duration of the upper form preparations), competition difficulty. Today, the armies are seeking a more pertinent system of potential evaluation.

This 2 systems are opposed also in other domains like SANHURST one (for example with promotions of very dissimilar cadets in matter of ages, academic level, duration of schooling) in comparison of ECOLE SPECIALE MILITAIRE DE ST-CYR which prepares the Army and the Gendarmerie direct recruitment officers. The student-officers are closer in all domains, even if the access ways are various: (Sciences competition, Economics and socials competition, letters competition, higher education graduate competition).

The Navy and the Airforce have only the scientific competition.

We must notice that the scientific way « Grandes écoles » label confers the sought after of the title engineer.

Each army in France has its own « grande école » which provides in a very large part what we call « the military elite », coming from a part of the best students.

Nevertheless, competition level and the selection rate are not now enough able to value the degree of army satisfaction for such type recruitment and reflection is in realisation. The aim is to settle personality test enough explicit and discriminate to separate applicants who don't seem to have clearly, the aptitudes especially behaviours for warcraft.

Officer applicant valuation and selection in future have accordingly to advance and will also probably draw nearer to the two following types:

- **Firstly, internal recruitment** by competition among the best NCO. (Valuing their generals military skills) or by choosing on files according to their notation. In this two case, applicants have a military file, several personalised annual notations. Therefore, military institution knows them and this last can easily be compared between each other.

- **Secondly, external recruitment** by competition or choosing completed by a potential value, which is based on experimentation and potential standing tests in realisation.

## **II - EXTERN RECRUITMENT APPLICANT OFFICER SELECTION PROJECT**

Among the external recruitment of officer's applicants, only the contractual applicant's officer's selection, which is directly in the charge of my direction, will be detailed.

### **2.1) External recruitment career-officers selection, by competition.**

Over and above the 2 years in the upper forms preparations system and the fact of passing a "grande école" competition, we want to add some personality tests. The aim is to separate the laureates who do not have the stability, the seriousness, the endurance and or the initiative of an officer.

This project is integrated into more global research concerning valuation dispositions, French officer's selection and orientation dispositions, research which is just beginning.

### **2.2) Selection of contractual applicant's officers careers by the extern way by choice or by file**

Commandment officer or specialist officer. (OSC)

This selection is composed of several steps, which include 3 interviews, a valuation, and hence national decided commission.

- The first interview concerns the mutual information between the applicant and the institution in order to make the file. It is realised by a regional recruiting officer.
- The second interview (called valuation) is realised in a C.S.O (there are 5 CSO in France), just after the applicant has been put through numerous tests and a physical fitness tests.

This valuation is based on the theoretical model called **P.O.Fit - person organisation fit - (krystoff)** which aims to measure the fit between **the army needs and the person's characteristics, that is to say the O.S.C applicant.**

**The army needs** are in determining by a post survey based on observation and psychometric valuation.

The method, which is used, is the judge or expert method in order to define the expected profile:

At the personality level (Big Five)

For the cognitive aptitudes (Fleishman questionnaire)

Our sample reaches more than 200 persons and is growing progressively with our investigation in the officer's formation schools and in the units.

2 types of posts are being studied:

- The commandment O.S.C whose aim is to command a platoon level.
- The specialist O.S.C whose aim is to work in the domain where he is an expert (post graduate)

**The applicant characteristics are valued in C.S.O.**

These elements are measured in terms of:

- Personality / General mental abilities / Coping by different potential valuation tests composed now by BIG 5, General Aptitude Test and by C.I.S.S (Coping Inventory for Stressful Situations).
- Psychomotor abilities: by a test named ESPACE, which exists since 1995.
- Physical abilities: by obstacle training course plus traction.
- The motivation: by the applicant observation during the all tests and the interviews. When these different results are provided, the valuing officer makes the synthesis and determines the P.O fit. He expresses an opinion taking into consideration the gap between the expected profile corresponding to the army needs and the results obtained by the applicant officer.

This opinion will be materialised by a hand-written appreciation and by a code:

- A: corresponding perfectly to the expected profile,
- B: corresponding probably to the expected profile,
- C: Does not correspond;

The risk of this system is to become too mechanised and generates clones.

In order to avoid this problem, officers who lead at different levels must take into account their experience of soldiers. Then the opinions of several recruitment officers are compared when they have to make a commitment decision.

The third interview is realised by upper officers of high levels. :

- For the commandment officers (O.S.C) by a Colonel (Major) whose job is to determine the commandment ability of the applicant.

- For the specialist O.S.C by an upper officer, experts in his competency field.

Finally, a national commission, regarding the previous results and the different opinions, will make a decision on a final choice of applicants according to the needs to fill jobs.

# The Canadian Forces Officer Selection System

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**Summary:** This paper provides a brief overview of the officer selection process for the Canadian Forces. The current size of the Canadian Forces and officer applicant and enrollee statistics for the main enrollment plans are included. The applicant processing sequence is described in general. Applicant attributes assessed in the selection interview and areas used to assign a specific occupation are discussed. Specific selection instruments, including aptitude testing, medical evaluation, the selection interview and fitness testing are described, and the use of these sources of information in the decision process is reviewed. Finally, the Naval Officer Assessment Board and the Air Crew selection procedures are described.

## 1. Overview of Officer Selection in the Canadian Forces

While Canada is a large country, it has a small population (estimated to be just over 30,300,000 in 1998) and maintains a relatively small military, called the Canadian Forces. The Canadian Forces is made up of two main components: the Regular Force and the Primary Reserves. The Regular Force is Canada's standing full-time military service; while it is mandated at a strength of 60,000 members, as of July, 1999, the effective strength was approximately 57,500 members, of which approximately 12,800 are officers. The composition of the Regular Force reflects the linguistic make-up of the country, with approximately 27% of the Regular Force Canadian Forces being Francophones and 73% Anglophones. As of April, 1997, the approximate strength of the Primary Reserve was 31,000, of which approximately 4300 were officers. Where the Regular Force entails full-time, career oriented military service, the Primary Reserve predominately involves part-time military employment. Reserve members typically parade one or two evenings a week with a Reserve unit and participate in weekend exercises. Full-time employment is usually available in the summer; however, some Reserve members do serve on full-time contracts, and often augment the Regular Force.

Applicants to the Canadian Forces are processed at Canadian Forces Recruiting Centres, which are located in major cities throughout the country. Selection processing of Regular and Reserve Force officer applicants is the same, and trained Reserve officers are able to transfer into the Regular Force. In the 1998-1999 fiscal year, there were 1869 Regular Force officer applicants of which 842 were

enrolled in the Regular Force. In the 1998-1999 fiscal year there were 398 Reserve Force officer applicants. The files of suitable candidates are forwarded to the Reserve units to make an enrolment decision; 201 files were forwarded.

There are a number of Canadian Forces officer entry programs. The primary Regular Force entry program is the Regular Officer Training Plan. Approximately 400 officer candidates were enrolled through this program in the 1997-1998 fiscal year, with 450 forecast to be enrolled in the 1998-1999 fiscal year. This plan includes education at the Royal Military College or at civilian Canadian universities. The next most common means of entry is as a Direct Entry Officer. These applicants already hold a university degree or technologist diploma in a suitable discipline; 223 applicants enrolled as Direct Entry Officers in the 1998-1999 fiscal year. The Officer Candidate Training Plan is a program for applicants with a high school leaving certificate to enter certain occupations that do not have specific university degree requirements. This plan will be phased out by 2002 in order to comply with the policy that officers have a university level education; only 42 applicants enrolled under this program in the 1998-1999 fiscal year. The final type of entry program includes subsidized special education. This applies to such programs as the Medical Officer Training Plan and Dental Officer Training Plan, where medical and dental students can have up to the last three years of their program subsidized, followed by a period of obligatory service in the Canadian Forces. Only 15 applicants enrolled in these programs in the 1998-1999 fiscal year.

Applicant processing follows the same general sequence for all officer entry programs. Processing is a blend of multiple hurdle and compensatory models. The first step is a check of basic eligibility requirements. All applicants must be between the minimum and maximum enrolment ages, must be Canadian citizens and must not have outstanding obligations to the judicial system; applicants who have engaged in sexual misconduct will normally not be enrolled. All applicants must be willing to comply with the Canadian Forces policy on discrimination, harassment and racism. If a candidate meets the basic eligibility requirements, they must meet the standard on the Canadian Forces Aptitude Test. If they meet this standard, a reliability check is performed. This procedure includes a check of criminal records and a credit check. The applicant receives a medical examination and must meet military medical standards.

If the applicant meets the medical standard, the applicant is then interviewed. The interviewer generates a report, in which the applicant is given a Military Potential rating and, if the program includes academic subsidization, an Academic Potential rating. Included in the interview is an assessment of drug use, which can affect eligibility for enrolment.

Following processing at the Canadian Forces Recruiting Centre, candidate files are sent to a centralized board. This documentation includes the selection interview report, two letters of reference and academic transcripts. For the Regular Officer Training Plan, documentation is also sent to the Royal Military College for an additional assessment of academic suitability. The purpose of the board is to compare all officer candidates on a consistent, national standard. The board produces a "merit list", which rank orders the applicants on the basis of suitability. The final selection decision made at the Canadian Forces Recruiting Services Headquarters, which uses the merit list provided by the selection board. Prior to enrolment, all applicants must meet the Canadian Forces minimum physical fitness standard.

## 2. Officer Candidate Assessment

The selection interview is conducted by two Military Career Counselors whenever possible. The Military Career Counselor is typically a junior officer from a Canadian Forces operational occupation. The Military Career Counselor receives specialized training in recruiting procedures and will serve from three to five years at a Recruiting Centre before returning to an operational environment. In addition, specialist Personnel Selection officers are also employed at major Recruiting Centres.

The "Recruiter's Handbook" clearly lays out the assessment process. The handbook states that "the aim of the assessment process is to evaluate the applicant's potential for successful integration into the Canadian Forces, particularly during basic and initial (military occupation) training". The selection interview format is semi-structured. Applicants are assessed on the following attributes, which are considered as contributing to success in initial military training and employment:

- a. Academic Achievement,
- b. Accepting Criticism,
- c. Conformity to Rules,
- d. Initiative,
- e. Motivation towards the Canadian Forces,
- f. Oral Communication,
- g. Performance under Stress,
- h. Perseverance,
- i. Physical Endurance,
- j. Team-work,
- k. Learning Potential, and
- l. Leadership Skills.

The Recruiters Handbook describes the following as Leadership Skills: "willingness to assume responsibility for group activity; and performance; the ability to prepare and plan group activities; effective communication to a group; the ability to direct and organize others towards the completion of a tasks; the ability to stimulate high group morale and performance; the ability to resolve disputes and maintain group harmony".

Assignment to a specific occupation is also addressed in the selection interview. The Recruiter's Handbook lists the following areas to be probed when assessing suitability for a particular occupation:

- a. Motivation,
- b. Work experience,
- c. Education,
- d. Occupation knowledge, and
- e. Applicant interests, likes and dislikes.

These factors must be considered in assigning an occupation, and the Handbook summarizes the process by stating "particular care shall be taken to ensure that the applicant has a thorough understanding and realistic expectations of the occupation being considered".

## 3. Selection Instruments

### A. Canadian Forces Aptitude Test

The Canadian Forces Aptitude Test is used as a screening measure to ensure officer candidates demonstrate a minimum level of cognitive ability. The test covers three domains: verbal ability, spatial ability, and problem solving ability. The applicant has the choice of writing either the English or French version of the test. Currently, the test is paper and pencil only and takes about an hour to administer; a computerized version has been developed but has not yet been implemented in the Recruiting Centres. The minimum standard is the twenty-fifth percentile relative to the officer applicant normative sample. Separate norms are maintained for the two languages.

### B. Medical

All applicants must meet the medical standards for their respective occupation and the common enrolment medical standard for the Canadian Forces. Six factors are assessed, and these are referred to as a medical category. The factors are visual acuity, colour vision, hearing, geographical limitations, occupational limitations, and the air factor. The geographical factor is "based on the effects that environment, accommodation, living conditions and medical care available would have on the medical status of a member". The occupational factor reflects the limitations that physical or mental disabilities place

upon a military member's capability and performance of duties. The air factor assesses medical limitations to serving as aircrew.

### C. Selection Interview

The attributes described above in the officer candidate assessment are considered in giving an overall rating of Military Potential. The Recruiters Handbook defines the Military Potential rating as the "probability of initial military success". The rating is given on a nine-point scale, ranging from "1" being substantially below average to "9" being substantially above average. Applicants assigned a rating of "1" or "2" (below average) are considered unsuitable for

enrolment. In addition, for programs that include academic subsidization, an Academic Potential rating is also assigned. This rating is also given on a nine point scale, and is based on the applicant's academic achievement.

### D. Fitness Test

A physical fitness test was introduced in June 1997. Prior to enrolment, all applicants must meet the minimum physical fitness standard. The test is conducted primarily by contractors registered with the Canadian Society of Exercise Physiologists. The standards are given in the following table.

Test Item	Men	Women
<b>Push-ups</b>		
Under 35 years of age	19	9
35 and older	14	7
<b>Sit-ups</b>		
Under 35	19	15
35 and over	17	12
<b>Hand Grip</b>		
Under 35	75 kg	50 kg
35 and over	73 kg	48 kg
<b>Aerobic Fitness</b>	Equivalent to <i>acceptable</i> rating for 2.4 km run	

Aerobic fitness is measured using a step test, which involves the candidate walking up and down a step apparatus at a regulated speed. The candidate's heart rate is measured at prescribed intervals to determine

the fitness level. The step test equivalent is the time required to complete a 2.4 km run, with the acceptable and superior standard given in the following table.

Age	Men		Women	
	Acceptable	Superior	Acceptable	Superior
Under 30 years	11:56-10:13	Under 10:13	14:26-12:36	Under 12:36
30-34	12:26-10:35	Under 10:15	14:55-12:57	Under 12:57
35-39	12:56-10:58	Under 10:58	15:25-13:27	Under 13:27
40-44	13:25-11:12	Under 11:12	15:55-13:57	Under 13:57
45-49	13:56-11:27	Under 11:27	16:25-14:26	Under 14:26
50-54	14:25-11:57	Under 11:57	16:54-14:56	Under 14:56
55 and over	14:56-12:27	Under 12:27	17:24-15:27	Under 15:27

### 4. The Decision Process

All officer applicant files are reviewed by a central board. The board uses rationally developed protocols for each officer occupation which reflect the relative importance of key factors for success. The board members are usually members of the occupation for which the candidate is being assessed and an "honest broker" from another occupation. The board places the applicant on a merit list, from which candidates are selected in a "top-down" method.

### 5. The System Utility

Present research focuses on the ability of the candidate to pass the Basic Officer Training Course. This is one of the first training "hurdles" that a new officer candidate must complete when accepted by the Canadian Forces. The present research program includes testing of students on the course with various cognitive and personality measures, followed by the correlation of test results with course performance results. The Royal Military College conducts its own research on the factors that predict success, with a focus on academic success. Recently, an analysis has

been undertaken of the Naval Officer Assessment Board (described in the next section) which was reinstated in 1996. Finally, validation of the Canadian Automated Pilot Selection System (described in the next section) is ongoing.

smoothness of operation and avoidance of over-corrections; and, co-ordination of flight controls.

## 6. Special Interest Topics

### A. Naval Officer Assessment Board

The Naval Officer Assessment Board replaces the selection board in the processing of naval officers. The Naval Officer Assessment Board follows assessment at the Canadian Forces Recruiting Centre. The Naval Officer Assessment Board is typically used in assessing naval officers who will proceed directly to military training, rather than to subsidized academic training.

The Naval Officer Assessment Board is made up of two main components: candidate orientation and assessment. The orientation component is intended to give candidates a realistic expectation of naval training and service. The most recent board included formal and informal information sessions with senior and junior naval officers, and ship tours. The assessment component includes the "Passage Planning Tests", which is intended to measure the cognitive abilities relevant to performing the duties of an entry-level naval officer. The assessment also includes a structured interview board, which is made up of senior naval officers. The stated purpose of the board is to assess "such elements as decisiveness, initiative and achievement motivation". The board also conducts a file review, which evaluates the candidate's background and experience, "addressing such factors as employment history, educational achievement and learning ability".

### B. Air Crew Selection

Aircrew selection is an additional step in applicant processing which follows assessment at the Canadian Forces Recruiting Centre; the results are central to the final selection board decision. Air Navigator applicants write a battery of five cognitive tests, which require a total administration time of two hours. Pilot applicants are assessed using the Canadian Automated Pilot Selection System, a single engine light aircraft flight simulator. The Canadian Automated Pilot Selection System syllabus consists of four sessions, each of approximately one hour duration. Over the course of each session, the system monitors and records the output from 10 flight instruments twice per second. The resulting 250,000 data points are converted into Summary Measures, which research found to be predictive of outcomes at Basic and Primary flight training. The Summary Measures assess the following broad areas: accuracy in maintaining prescribed flight parameters; speed of response to errors/warnings; variability in performance;



## Can Psychological Selection be the Same for All Dutch Officers?

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Since a couple of years there is in the Netherlands one national Defense Selection center. With the exception of pilots all Dutch officers are selected there. In this Selection Center there is a tendency to equalize as far as possible the procedures for the different officer corps, and to differentiate only when there are different requirements in practice. In this reading on the officer selection in the Netherlands the different procedures for four Armed Forces is discussed and the tendency to make them more uniform.

First I will give an survey of the officer selection and some background information about the Dutch military forces. Then I will speak about the different phases of the selection process. At first the administrative pre-selection, where the first screening takes place, in which there is decided if the applicant is admitted to the official selection. Next the psychological examination, existing of capability tests, personality questionnaires, and the interview; the medical examination with connecting physical tests; assessment tests for the Corps Marines and for pilots, and finally the Selection Admission Boards.

In each phase of the selection procedure I will indicate the differences between the Forces, and explain on which grounds these differences are made.

### 1. SURVEY OF THE NATIONAL SELECTION SYSTEM

The Netherlands are a relatively small country. The surface is 41.000 km<sup>2</sup>. The distance from the capital Amsterdam to nearly each place is 200 km at most. The country counts 15 million citizens. The Netherlands form the Kingdom of the Netherlands with six small islands in the Caribbean. These six small isles have their own government, but the Netherlands are responsible for their defense. In the Netherlands there is an extensive school

system. It is easy to go to school. Until the age of 16 everyone is obliged to go to school and this education is free. From the age of 16 education is voluntary. Secondary school costs then about US \$ 800 a year, university US \$ 1300. Thanks to all kinds of scholarships most of the young people continue their formal education.

The Dutch Armed Forces consist of the Royal Navy, the Royal Army, the Royal Airforce and the Royal Military Police. Together the Armed Forces employ 56.000 military personnel and 18.000 civilians.

In 1996 conscription is abolished. There are now only volunteers. Most of NCO's have a contract for limited time; at the moment 60% of the officers have an engagement for life, in the future this will be 40%.

Besides the defense of the borders of the country and the assistance on calamities an important task of the Dutch defense is nowadays to assist in peace keeping and peace enforcing all over the world. There are at the moment more than 3.000 military men on duties abroad.

The Netherlands have two military academies for officer studies: the Royal Institute for the Navy and the Royal Military Academy for the Army and the Airforce. The Royal Military Police recruits its officers out of the officers of the other Forces. The military academies are no universities, they are institutes for higher professional schooling. The officer studies take three years.

Each year about 250 students are needed for both academies. For this there should be about 1.000 applicants. Besides these there are needed each year about 60 pilots for the three Forces. In the selection for pilots for the Airforce only 2% of the applicants turn out to be suited.

On grounds of financial reduction the government in 1995 decided that the selection of Dutch military personnel had to be centralized in one organization, the Dutch Defense organization for



**Recruitment and Selection.** This organization is responsible for the total recruitment and selection of all military men. The only exception is the selection of the pilots for the Airforce, which takes place elsewhere. Since 1996 the selection procedure for officers is the same for all the three forces. It takes place now in Amsterdam.

The Dutch organization for Recruitment and Selection is itself responsible for the instruments of selection and tests. The forces decide which instruments must be used and which scores are acceptable.

The Dutch organization for Recruitment and Selection aim at making the test procedures and acceptable scores the same for comparable functions of the different forces, and to accept only differences that are based on the different demands in practice.

## 2. THE ADMINISTRATIVE PRE-SELECTION

The administrative pre-selection is the same for the four Forces.

The minimal requirements are:

- Dutch nationality
- length: men 1.65 m, women 1.60 m.
- relevant school diplomas with at least Dutch, English and mathematics and for some functions physics.

About 4% of the applicants does not fulfill these requirements.

## 3. THE PSYCHOLOGICAL EXAMINATION

This takes two days.

On the first day the applicants make all the capability tests and fill in the personality questionnaires, on the second day the interview takes place and materials are prepared for the Admission Board.

### 3.1. CAPABILITY TESTS

All applicants for officer studies do a number of intelligence tests and for some functions also specific capability tests. Although intelligence tests have in psychological literature a high predicting value, they play a role of minor

importance in the selection of officers in the Netherlands. Research has shown that the marks in the last grade of the secondary school (VWO) have a better predicting value than IQ-tests. Only when applicants have another secondary school education, the tests have predicting value. Tests used are:

General capability tests:

- verbal reasoning
- non-verbal reasoning
- logical arithmetic test
- test for technical insight

Specific capability tests:

- selected listening test
- air controllers test

The specific capability tests are used for a number of Airforce functions. For pilots there are simulation tests.

### 3.2. PERSONALITY QUESTIONNAIRES

The applicants have to fill in three questionnaires that deal with:

- social functioning
- neuroticism
- extravert / introvert
- flexibility
- leadership capabilities
- acceptance / tolerance
- self esteem
- impulsiveness
- achievement orientated

The Forces acknowledge different values to the different scores of these questionnaires.

### 3.3. THE INTERVIEW

All applicants have an interview of 75 to 90 minutes. In this interview the next factors are evaluated:

- social functioning
- discipline
- psychological stability
- will to achieve
- sportsmanship
- suitability for missions all over the world

- leadership capabilities
- motivation for the specific force and the function
- knowledge of the desired function

After the interview the interviewer values each factor on a four or five-point scale. The Forces use the results of the interview in a different way. They have however in common that they demand a minimal score for almost every factor.

#### 4. MEDICAL EXAMINATION

This examination takes one day and consists of a medical examination and some sport-tests.

The medical examination:

- visual and auditory examination
- laboratory examination (urine)
- if necessary X-ray photographs
- physical examination by a doctor
- interview by a doctor

The physical fitness tests:

- measurement of the jumping abilities
- measurement of the muscular strength
- bicycle-test

The Royal Navy does not apply the physical fitness tests.

#### 5. ASSESSMENT PROCEDURES FOR CORPS MARINES AND PILOTS

Applicants for the Royal Corps Marines will have, after the basic psychological and medical selection procedure, an assessment trial, which takes two days.

It consists of:

- climbing into a rope and a tower
- carrying another person
- fitness tests
- delivering a lecture
- cross country
- solving a group problem
- obstacle race
- leadership tests

The applicants are judged on:

- physical capabilities

- communicative abilities
- perseverance
- leadership capabilities

The results of this assessment trial play a role in the admission procedure. Some candidates withdraw their application during or after the trial.

Applicant-pilots for Airforce and Navy undergo after the medical examination two more sets of tests, computer simulation tests for pilots and flying tests in practice. The computer simulation test for pilots consists of six flying exercises, which the applicants have to learn in four days. Judged are the obtained results and the speed of learning.

The flying tests in practice: under the supervision of an experienced instructor an applicant gets flying lessons for five days. Judged are the obtained results. Also contra-indications such as air sickness, flying fear and G-tolerance are measured.

#### 6. SELECTION ADMISSION BOARDS

All Forces have their own Selection Admission Board. These will all see the applicants personally and establish the following order for admission. The Boards prefer to get 1.5 times the number of applicants as they need for the contracts.

#### 7. FINAL REMARK

For a relatively small country like the Netherlands it is good to have a joint selection center for all officers. In this way it is most guaranteed that the four Forces get the right number of applicants of the required quality at the right time. A consequence of the joining is that the differences in requirements become more visible. These differences are being discussed with the Forces. But the starting point is correct. The Forces decide on their own psychological selection-criteria.

# The Conceptual System of Officer Applicants to Military High Schools from the Air Force, the Navy and the Army in Poland

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**Summary:** The paper contains the basic information concerning the system of officer applicants to Military High Schools in Poland. It is presented methods of psychological assessment of the applicants and the role of psychologists in the whole recruitment procedures.

## 1. Introduction

The method of selection used by the Polish military psychologists is a combination of classical psychological tests and the methods developed originally by Polish military psychologists. These tests are designed to select the best candidates for the cadet schools. The general concept is directed to the identification of individuals with specific psychological traits. A young man possessing average intelligence, normal personality, good eye-hand co-ordination, and high motivation to serve the country may have chance to be selected.

## 2. The system of selection in the Polish Army

The necessity of an assessment of applicants to the Army officer school results from specific demands of the educational system in the Polish Army. For over 15 years applicant's selection has been focused on identification of psychological skills and abilities. In spite of the present democratic changes in our country the new selection system is not reflected in tests applied for officers' selection. The process of officers selection is concentrated on intellectual and temperamental assessments. However, it must also include the ability to co-operate with other people. The basic psychological task, which was established in the beginning of creation the test battery for selection purposes, pointed out the characteristics of professional profile of officer cadets made both by psychologists and commanders. The characteristics concerned, commanding, technical and logistic profile.

The initial establishment was based on the Guilford Intelligence Theory. The tests were constructed by Polish psychologists and consist of

four separate methods: the RiD-S-4 is the test to study general mental ability of the candidate, the TSP-3 test is an instrument to study three-dimensional spatial imagination and thinking of the candidate. In the TRW test the candidate has to state the truthfulness of the conclusions he has drawn after learning given facts. The TRS-4 test is to learn an active range of the vocabulary of the candidate. The battery of these four tests (RiD-S-4, TSP-3, TRW, TRS-4) permits approximately to qualify an IQ of an applicant. The IQ is made with the multiplied regression equation. The coefficient of the multiplied correlation for all the tests is 0.77, and individually for each test as follows:

RiD-S-4	0.453
TSP-3	0.442
TRW	0.240
TRS-4	0.266

An assessment of temperament is based on The Temperament Questionnaire by J. Strelau. According to the Strelau's foundations temperament is meant as stable features of the organism which reveal themselves in formal traits of behavior as its energetic level and temporal characteristic. Temperament in comparison with other psychological phenomena is less susceptible to change. Reactivity as a primary a primary temperament feature determines the sensitivity (sensory and emotional) and the organism's capacity to work (its endurance). Having in mind persons who occupy extreme positions on the reactivity dimensions it maybe distinguish between high and low reactive individuals. High reactive individuals characterized by high sensitivity and low endurance are less qualified to the service. The results given above are not only directed to qualify the candidate for a proper training. An influence of social environment and standard living of the candidate must also be considered, especially if they could effect on the lower results of the tests. Those factors are included in the psychological interview, which is

aimed on receiving an information necessary for a deep diagnosis of individual characteristics of the candidate.

The psychological interview is expected to:

- a. determine individual characteristics of the candidate;
- b. discover the mechanism of justification for taking up the military studies;
- c. initially determine fields of interests of the candidate;
- d. determine factors enabling efficient fulfilling the requirements of the military studies, especially an ability of learning;
- e. ascertain a rate of adaptation to the new social conditions at the military college, persistence in undertaken activities;
- f. ascertain clear indications whether the candidate cannot join the military college. Some contraindications could also result from the points a., b., c., & d.

The psychological interview is expected to provide the necessary data concerning the candidate behavior under the environmental obstacles. The special attention is paid to the following attributes:

- leadership and organizing abilities;
  - ability to manage and act under unexpected circumstances;
  - social and emotional maturity;
  - ability of independent judgment;
  - individual courage and an ability to act independently;
  - friendliness;
  - emotional resistance;
  - manner of expressing one's thoughts.
- and negatives:
- tendency to abuse alcohol, drugs, etc.;
  - poor social adaptation among the others;
  - learning difficulties;
  - low level of discipline;
  - tendency to social conflicts (aggressiveness, destructiveness, etc.);
  - extreme egoism;
  - reluctance to respect orders;
  - low level of mental resistance;
  - extreme intolerance of the others' behavior.

When interviewing the candidate, the psychologist tends to create readiness to cooperate to weaken any fear of expressing his thoughts. That is why the first contact is so significant. That should be a warm and kind meeting with the candidate and a good point to start a friendly conversation.

In 1998 year in the Polish Army 12, 3% candidates became disqualified because of different psychological dysfunction.

### 3. The Polish Air Force system of officer selection\*

Nowadays psychological evaluation in Polish Air Force is based on paper and pencil tests and Vienna Test system which mainly includes operational tests presented on the computer screen. Tests used for investigation of pilot candidates can be divided into three groups:

Cognitive tests:

Progressive Scale of Intelligence Matrix-Raven  
Schult's Table of black and red figures measuring of operational thinking. Time performance and number of errors are taken into account.

Toulouse-Pieron's test is used to investigate a speed of perception and attention divisibility dealing with figures (zero-content material).

Operational tests :

Choice reaction time to measure complex visual stimuli and single acoustic stimuli,

Tracking test (Three Dimensional Point Tracking 3 PTR) to measure parameters of eye-hand co-ordination

DEST-1 (Test to Examine Speed-Distance Estimation) designed to assessment accuracy of the two varying vectors: speed distance.

2 HAND (Two Hand Co-ordination) designed to assess motor skills used to perform technical tasks, specifically eye-hand-hand co-ordination.

C. Emotional and personality structure tests:

Anxiety as a state (X1) and as a trait (X2) according to Spielberger Questionnaire.

The. J. Brzezinski Emotional Control Questionnaire used for controlling emotional expression, emotional versus rational motivation, emotional resistance, situation control, emotional stimulation and finally for measuring the general results of scores

I-E Rotter locus of control scale

The EPQ-R Eysenck. test. The questionnaire measures: a) level of neuroticism (EPQ-N), b)intra-extraversion (EPQ-E), c) psychotism (EPQ-P), d) control scale (EPQ-L).

\*This part is partially adapted from IAMP Symposium's presentation (Florence 1999) announced by Dr J. Maciejczyk from Polish Air Force Institute of Aviation Medicine

The temperamental traits according to the Strelau Temperament Questionnaire. This questionnaire is measuring the following traits: a) alertness, b) perseveratibility, c) sensor reactivity, d) emotional reactivity, e) endurance, f) activity.

External criteria were used for verification of prognostic values of the psychological tests. The results of 4 following task were performed during simulator flights and results obtained from basic air training. In the Polish Air Force Institute of Aviation Medicine the program called "Complex System of candidates selection to Military Aviation with use of simulators and military aircraft" was introduced in years 1993-1995. The basic aim of the program was to elaborate new methods of the candidates estimation to be military pilot. The most important investigative device was the „Japetus" flight simulator and complex, practical not used until now in qualifying, set of medical and psychological tests (for example eye movement monitoring). The flight simulator tests were introduced in the Polish Air Force training in accordance with the selection program for pilot candidates. The "Japetus" flight simulator is able to acquire perception and decision-making abilities simulating the real flight conditions as well as the objective measure of aviation skills.

Basing upon the multivariate analysis and discrimination it was determined which of the tests for psychological selection were specifically efficient to predict success or defeat within the groups of pilot candidates (basing on aviation simulator performance). These tests evaluated the temperamental traits, perceptive-motor skills and speed-distance estimation. The similar results were obtained when the psychological tests and basic air training results were compared. The traits discriminating candidates who perform their flights either good or bad, were the traits of temperament, emotional control (Brzezinski), perception properties (RT), operative thinking (Schulte test), eye hand co-ordination (2 HAND) and relation speed-distance (DEST-1).

Temperament is related to the essential, relatively constant personality traits, manifesting mainly in the formal characteristic of behavior (energy and time consuming parameters). The temperament traits have an effect upon shaping the so-called style of activity (way of doing some things). Furthermore, the temperamental traits constitute one of the most crucial factors determining preference toward an individual in a sphere of activity or situation, featuring the notion of stimulation. In addition to temperamental traits, the most discriminative perception properties

determining groups are such as skills of operational thinking focusing upon perception-attention and memory (Stiletto Table), eye-hand co-ordination and ability of the proper evaluation of speed-distance relation (2 Hand, DEST-1). The interindividual differences in the ability to judge speed and distance attain high values. This test, however, correlates with the temperamental traits. The flight simulator's results of applicants subjected to investigations, and moreover their either good or bad performance can be anticipated by psychological test performance quality 2 HAND and DEST-1. The above mentioned tests require from the

candidates some skills to change behavior in response to alterations of external conditions. The behavior mobility also involves such features as speed, rate, maintenance and repetition. It was indicated, that the mobility plays an important role in adaptation process and that trait of temperament enables some relations or links between temperament and cognitive skills.

Good results in psychological tests and completion of basic flights (individual flight) were practiced as psychological criteria for air training in military aviation.

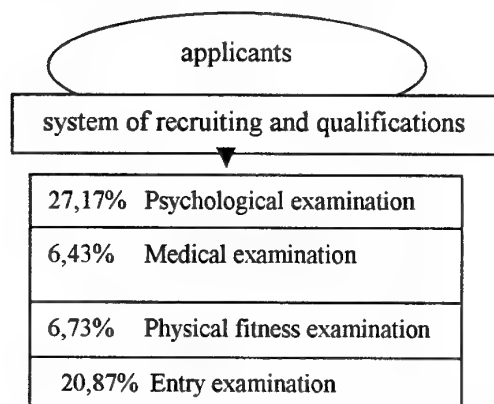
#### **4. The system of qualifying applicants in the Polish Navy officers school**

A psychological diagnosis in the Polish Navy is understood as a usage of various methods like: observation, interviews and psychological tests to discover disturbances in candidates' behavior concerning, first of all, their motivation and cognitive processes prognoses included, both in educational and adaptation problems in college. The process of psychological selection starts from the moment of arrival of the candidates to college and continues to the moment of completion of the studies. The base which created psychological implication was built on opinions of experts qualifying features of personalities of successfully graduated Navy officers. The expert's opinion was treated as the model of personality, which became the foundation for further scientific investigations. The model included ethic traits, physical-fitness traits, personal culture factor, psychological traits, and professional traits. In a theoretical language of psychology it isn't the true model but rather a background for applying different method of applicant's assessment. The model determines the pattern to which students of the Naval Academy should tend and realizes three functions: firstly to determine theoretical construct, specific ideal model, secondly gives the possibility of approximate comparisons of individual with ideal,

thirdly-thanks to the model one can compare results from recruitment and selection process of candidates and observation of students behaviors. The first stage of selection is aimed on:

- choice from candidates these, who may function on optimal level according to the model
- exclusion of these candidates who show psychopathic disturbances behavior and asocial tendencies.

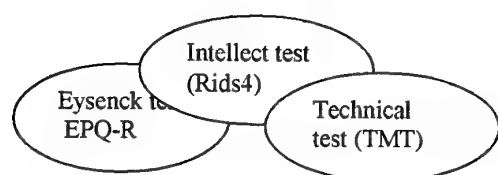
Results of applicants' selection and qualification in Naval Academy (1996-1998)



Special attention should be paid on the results of psychological investigations -27, 17 % of the whole number of candidates are excluded due to results of psychological reasons.

More detailed structure of investigations of candidates is introduced below on following schema:

Results of psychological investigations are subjected to the multiple correlation in respect of intellectual and adaptation factors



EPQ-R intro-extraversion psychotism level of neuroticism

Rids-4-mental thinking abilities, visual-space abilities, verbal abilities

TMT-technical thinking abilities

Multiple regression function for prognosis of study success is  $PSS = 3x1 (Rid) + 4x (TMT)$ . Applicants obtaining in neuroticism above 8 in standard points scores are automatically rejected. After enclosing multiple regression results of personality and intellectual investigation 4 groups were created but only applicants from group 1 are qualified to the next stage of selection.

G <sub>1</sub>	Y <sub>w1</sub> and Y <sub>w2</sub> between 4-10 standard points scores-positive type of personality, low level of anxiety
G <sub>2</sub>	Y <sub>w1</sub> and Y <sub>w2</sub> between 4-10 standard points scores-negative type of personality, high level of anxiety
G <sub>3</sub>	Y <sub>w1</sub> and Y <sub>w2</sub> between 1-3 standard points scores-positive type of personality, low level of anxiety
G <sub>4</sub>	Y <sub>w1</sub> and Y <sub>w2</sub> between 1-3 standard points scores-negative type of personality, high level of anxiety

## 5. Conclusion

The common base of three services selection conceptual system is an inclination to identify psychological traits. Only the Polish Navy psychologists declare that their system is grounded on the model. This model isn't available in written material that is why it isn't possible to verify its foundation. But the Polish Navy psychologists try to create prognoses through observation of qualified cadets up to the end of their military education. After graduation the final psychological opinion is made and sent to the Personal Department Ministry of Defense. This is an example of unique co-operation between psychologists and personal officers.

On the other hand, in case of Air Force the psychological testing is part a of wider procedure including also entrance exams and simulator flight performance. It means that psychological part of selection has only additional (not obligatory) character and may be taken into account (or not) in the final qualifying decision. The worse (in author's opinion) solution was chosen in the Army because psychological investigation is taken in small psychological units located in 40 cities. It means that standard of the investigations is difficult to compare between units. At this level, information is sent to the officers schools where the final selection process is taking place. The feedback information is not available for the psychologists in units and they don't know if their results may have any influence on final qualifying decision.

# Technologies for Integrated Assessment and Selection Systems

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## Introduction

This paper looks forward from the last Nato review of computer-based assessment (CBA) of military personnel (Burke and Van Raay, 1993; see also Burke, 1993, and Burke et al., 1995). At the time of that report, research and development among Nato nations could be summarised according to three areas of work:

- Desktop systems delivering traditional tests and questionnaires as well as more dynamic tasks developed from paradigms from cognitive psychology, using LANs and WANs, and from which the principle gains were the increased reliability and reduced costs from automation of the assessment process. Systems characterising this approach included those developed by the Royal Air Force (RAF) in the UK for officer and aircrew selection (Burke, 1992, and Burke et al., 1994), Project A in the US, Taskomat in the Netherlands and the ESPACE system in France.
- Simulation-based assessment (SBA) systems for delivery of sophisticated work sample measures usually administered after prior screening using paper-and-pencil or desktop tests and questionnaires, and developed for selection to high risk/high cost roles such as aircraft pilot. Systems characterising this approach included the CAPSS system in Canada and the GUTS in Belgium, as well as a range of systems developed in Germany. The primary focus of these systems was increased validity and reduced training costs against which the substantial costs of SBA development and administration could be recovered.
- Adaptive testing systems that sought to exploit capabilities unique to CBA in delivering tailored testing (i.e. measurement geared to an individual's level of ability). The US CAT-ASVAB programme stands as the most

substantial work in this area to date. As well as adaptive testing, the late 1980s and early 1990s also saw the advent of item generation techniques in which item engines contained in the test software produce the item or task on-the-fly during a test administration. The UK British Army Recruit Battery (BARB) system was the first item generative system to go live in military assessment, though the same methodology was also used to produce fixed parallel forms of paper-and-pencil tests for the Royal Navy (the ABC test battery).

The driver for the development of these systems was the expectation of gains in the utility of military selection processes. Utility is defined as the financial gain from a selection process and, as shown in Equation 1, is dependent on a number of factors:

- The validity of the process in predicting the outcome of interest (e.g. training success, job performance, turnover) as represented by  $r_{xy}$  in Equation 1.
- The selection ratio or average quality of those selected as shown in the equation by  $\bar{Z}_x$ .
- The variability in performance as represented by  $SD_y$ .
- The numbers selected or  $N$ .
- The cost of the process as represented by  $C$ .

$$U = (\bar{Z}_x \cdot r_{xy} \cdot SD_y \cdot N) - C$$

**Equation 1: Utility of a selection process**

The driver of greater utility still stands and, while specific numbers will not be quoted, what follows in this paper is the outline of a process that seeks to maximise  $U$  by ensuring the attraction of applicants, the sifting of those applicants through an integrated framework, and the management and



harvesting of data through the backbone offered by the model suggested.

### Technology today six years on

Bartram (1999) has recently provided a summary of developments in the technologies underpinning CBA that serves to update the field of play since 1993. Among the most significant developments are:

- Widespread availability of inexpensive high-powered computers either at work, home or places of learning (e.g. colleges, universities, libraries).
- Greater reliability in software and hardware, critical to CBA systems.
- Improved user interfaces and facilities such as sound and video cards.
- Greater connectivity with the advent of the internet and e-commerce.
- Greater convergence towards common standards for hardware and software, which has brought with it the capability to deliver more sophisticated applications over networks and the internet.

To these can be added ever increasing connectivity such as surfing the web from home television sets (or, for that matter, any place in which a person is sedentary for any period such as their car), and ever increasing transportability as offered by access to the internet or company intranets (or, indeed, extranets) via mobile phone and palmtop technology, technologies by the way encouraged by military requirements such as battlefield communications.

It is also worth mentioning some of the statistics now being quoted for the internet to give a sense of the real impact this is having on the recruitment and selection market (again, I am grateful to Dave Bartram for these statistics):

- There are currently estimated to be 130 million internet users world wide, and this is expected to double in the next five years.
- By 2002, predictions suggest that 98% of large companies, 85% of medium sized and 45% of small companies will be online.

In relation to the recruitment market, the launch of the LAI Compass site by SHL in the USA resulted in 40,000 hits within the first few days, far greater

than expected. In the UK, the launch of the Korn/Ferry site drew 10,000 hits within the first six weeks. A recent Institute of Personnel Development report issued in the UK shows that the use of internet recruitment had grown to 32% of UK companies by May of this year (IPD, 1999). The most frequently visited sites in the US are those with the word *career* in their URLs.

Today, then, the biggest contrast with what was CBA state-of-the-art in 1993 is the advent of distributed assessment and this will be the focus of the model described next.

### A model for a distributed assessment system

Figure 1 below shows a template for a process supported and delivered by a Distributed Assessment System or DAS. What this template shows is, in fact, a process that will be familiar to those operating in recruitment and assessment. However, as shown by the vertical arrow, what differentiates this as a DAS includes:

- The component parts of the system are integrated in that each stage generates data that feeds into a rolling profile of the individual applicant. The assumption is that the system is constructed to capture data related to a clear competency profile or library of such profiles. Thus, rather than, let us say, an application form stage and a subsequent CBA stage operating as discrete elements with different rules and types of outputs, they are parts of an integrated system using a common assessment framework into which all data flows.
- That the cost of the assessment transactions at any stage of this process are actively managed by a systematic approach that also adapts the breadth and depth of the assessment dependant on the volumes handled at any one stage. So, breadth rather than depth of the assessment are the focus at the initial stages where volumes are high, while depth and breadth of assessment are introduced at those stages where they become more cost effective.
- At each stage, data can be mined to deliver a risk analysis to support decision making. At the first stage, decisions might be made using a minimum standards approach (in UK language a minimum competence approach), eliminating those falling into the higher risk categories. This *select-out* focus can be changed at the later stages to a *select-in*



principle, and issues such as placement (i.e. which role or career track should the person be assigned to) can also be actioned (indeed, this could be an aspect of the system built in at the earlier stages).

- Data is available for transmission within the organisation so that geographical spread of decision-makers is no longer a problem. For some organisations where geography is not a problem, it is the geography of the applicant that is catered for. For those organisations where the geography of decision-makers is an issue, then the geography of both applicants and decision-makers is catered for.
- The added value of the data culled and mined through this process does not end when a selection decision is made. When the person selected enters service, then the data gathered on their competencies, their strengths and development needs, also enters with them. As such, the DAS shown in Figure 1 is effectively the front end of a Human Resources Information System (HRIS) which is populated with data by applicants, and which the organisation can then mine for training and development purposes as well as making selection decisions.

The added value of DASs to public relations, fairness and diversity, and to extending the reach

of psychological assessment. The most obvious candidate as an assessment tool for the first, high volume stage of this system is biographical data (biodata). However, the potential for such a tool is greater than simply capturing data. As will be shown in the presentation, while *e*-recruitment is growing fast, it is also dominated by CV (or resume) machines which vary in their sophistication from electronic forms (i.e. simply replacing a paper form) to text search machines. Yet, neither actually seize the benefits of either automated processing (the electronic forms have to be read by someone either on screen or on hard copy, so the grunt work remains) or of a valid psychometric backbone (while resume machines are in use in the UK, the IPD report mentioned earlier also cites the issue that companies are finding the quality of those recruited via the internet to be moderate to poor).

The extension of the biodata component of a DAS serves a number of very important purposes. First, research consistently shows that softer items (such as those tapping competencies) are as, if not more, valid predictors of performance than harder items about qualifications, education etc (see Stokes et al., 1994, for examples). So, building on the competency profiling that gives the DAS its shape and purpose, biodata feeds directly into the rolling assessment described earlier (indeed, in the US, harder biodata items generally only serve to operate as gross negative disqualifies or GNDs in

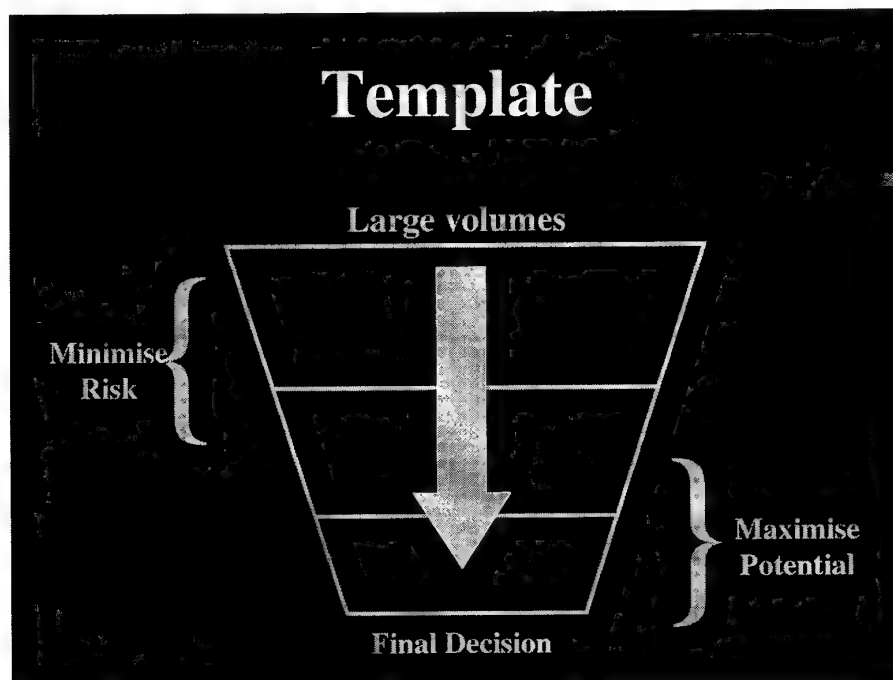


Figure 1: Model of a Distributed Assessment System for Selection

terms of the absolute must-haves for a job such as driving license or absence of a criminal record). Second, research also shows that biodata has minimal adverse impact on minority applicants. As such, the inclusion of competency based biodata instruments in the DAS, and rolling this data into other data collected at later stages, not only improves the cost management of recruitment through the DAS, but also adds to the validity and fairness of the final selection decisions.

The third aspect of the DAS at the front end that competency biodata can serve is that of public relations. First, on-line support can be provided to those coming onto the recruitment site (the *whats* and *whys* of the job, role or career track, as well as the *how* of the application process), but also feedback on the outcome of this first assessment can also be provided. Thus, applicants get a faster turnaround to their application, but they also get added value in a diagnostic against the competencies for the job and not just a well-done or goodbye letter. What is more, assessment serves as a vehicle for attraction in an increasingly competitive employment market.

Much of the latter functionality (though not the competency based biodata assessment) can be found on the British Army recruitment site (one that has won many awards for its innovation). Another aspect of that site also feeds into one future aspect of a DAS that will serve to close this paper. The British Army site has the Army Challenge that comprises a series of screens through which the applicant engages in a battlefield problem. This serves to give the site life and to inform the applicant's decision to apply or not (i.e. an interactive realistic job preview). It also demonstrates that other forms of assessment can be deployed at the very earliest stages of the DAS. In the presentation, I will describe dynamic assessments currently being developed that incorporate elements of the situational judgement (Motowildo et al., 1990) and naturalistic decision-making (Klein et al., 1993) paradigms in psychological assessment. To this can be added the possibility of also including elements from the assessment centre approach at any stage within the DAS. Thus, the capability of a DAS to provide a range of assessments at any selection stage is considerable.

### Some concluding comments ...

I hope that this paper has served to convey the potential of the DAS concept with which SHL and

others are now actively engaged, and that DASs represent a new threshold for assessment and selection systems for military officer. The driver in terms of utility that was there in 1993 remains today, and rightly so. However, the potential of what was being offered in 1993 can now be extended within distributed assessment to an effect that was not imaginable when RSG 15 drew up its report. Furthermore, the term system becomes all the more powerful with a DAS that has a valid psychometric backbone and that operates as the front end of a HRIS. With tomorrow's world already upon us, one of the key challenges for officer selection must be the development of DASs today.

### References

- Bartram, D. (1999). *Testing and the internet: Current realities, issues and future possibilities*. Proceedings of the Fourth Test User Conference. Leicester, UK: British Psychological Society.
- Burke, E. (1992). *On the validation of rather a lot of computerised tests*. Paper presented at the British Psychological Society Annual Conference, April, Scarborough.
- Burke, E., Bradshaw, J., and Hobson, C. (1994). *Designing and implementing a large scale computer-based testing system*. Paper presented at the British Psychological Society Occupational Psychology Conference, Birmingham, January.
- Burke, E. (1993). *Pilot selection in NATO: An overview*. Proceedings of the 7<sup>th</sup>. International Symposium on Aviation Psychology. Columbus, OH: Ohio State University.
- Burke, E., Kokorian, A., Lescreve, F., Martin, C. J., Van Raay, P., and Weber, W. (1995). Computer-based assessment: A NATO survey. *International Journal of Selection and Assessment*, 3, 75-83.
- Burke, E., and Van Raay, P. (1993). *Computer-based assessment in NATO: Final report of Research Study Group 15*. Brussels, NATO Headquarters: AC/243 (Panel 8) TR/12.
- Institute of Personnel and Development (1999). *IPD survey report 5: Recruitment*. London: Institute of Personnel and Development.
- Klein, G.A. (1993). A recognition primed decision (RPD) model of rapid decision making. In G.A. Klein, J. Orasanu, R. Calderwood, and E. Zsombok (Eds.). *Decision making in action: Models and Methods*. Norwood, N.J.: Ablex Publishing Corporation.

Motowildo, S.J., Dunnette, M.D., and Carter, G.W.(1990). An alternative selection procedure: The low-fidelity simulation. *Journal of Applied Psychology*, 75, 640-647.

Stokes, G.S., Mumford, M.D., and Owens, W.A. (1994). *Biodata handbook: Theory, research and use of biographical information in selection and performance prediction*. Palo Alto, CA: Consulting Psychologists Press.

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